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THESIS

PERSONAL, SITUATIONAL, AND ORGANIZATIONAL DETERMINANTS OF NAVY ENLISTED ATTRITION

by

John V. Smith, Jr.

and

Walter Anthony Kendall

June 1980

Thesis Advisor: R. S. Elster

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This thesis was conducted to identify predictors of first-term Navy enlisted personnel attrition and to determine the relative influence of various individual and organizational factors on attrition. A cohort of non-prior service recruits was tracked over a 34-month period, and the attrition rates of general detail and Navy A school personnel holding a voluntary release option were compared to those of a control group not holding such an option.

#20 - ABSTRACT - (CONTINUED)

Whereas the traditional demographic predictors, in isolation, explained only a small percent of the variance in the dependent variable (attrition), a marked improvement in accuracy of attrition prediction was observed following the inclusion of various organizational and situational factors, such as Navy school attended, entering rate, and initial fleet assignment. These variables added significantly to the accuracy of attrition predictions and should aid Navy managers in developing initiatives for countering attrition.

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Personal, Situational, and Organizational Determinants of Navy Enlisted Attrition

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ABSTRACT

This thesis was conducted to identify predictors of first-term Navy enlisted personnel attrition and to determine the relative influence of various individual and organizational factors on attrition. A cohort of non-prior service recruits was tracked over a 34-month period, and the attrition rates of general detail and Navy A school personnel holding a voluntary release option were compared to those of a control group not holding such an option. Whereas the traditional demographic predictors, in isolation, explained only a small percent of the variance in the dependent variable (attrition), a marked improvement in accuracy of attrition prediction was observed following the inclusion of various organizational and situational factors, such as Navy school attended, entering rate, and initial fleet assignment. These variables added significantly to the accuracy of attrition predictions and should aid Navy managers in developing initiatives for countering attrition.

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INTRODUCTION

Problem

Personnel attrition, the separation of first term enlisted personnel prior to completion of their initial service obligation, is well-recognized as a severe problem in the Armed Forces today. Navy attrition rates for first-term male recruits have increased from 30 percent during 1971 to over 40 percent during 1977 [Lau, 1979]. National press coverage of ships unable to sail due to shortages of skilled enlisted people to run them and repeated warnings by top military officials are indicative of this all too familiar problem.

While the Navy has numerous initiatives and programs currently under way, considerable research is still ongoing to fill gaps in our knowledge about attrition and how to counter it. Traditionally, most studies aimed at individual demographic and personal factors while ignoring dynamic variables such as working conditions and organizational differences. Attrition is a most complex phenomenon that can probably only be explained by simultaneously considering individual, situational, organizational and other environmental variables.

Background

In February 1975, the Chief of Naval Operations [Note 1] established a Task Group for the purposes of: (1) studying

a proposed alternative to the current naval corrections system, and (2) addressing various aspects of recruiting, recruit training, remedial education, and administrative and legal procedures that impact on the corrections system. Subgroups were formed within the Bureau of Naval Personnel (Pers-84) Task Group to, among other initiatives, develop alternatives to or recommendations for methods of expediting the discharge of individuals unsuited for naval service.

In March 1975, the Task Group submitted its report [Note 2] to CNO, having concluded that "the present system for recruiting, corrections, and administrative discharge in a peacetime, all-volunteer force environment, results in non-productive manpower and administrative costs of at least $228,000,000 annually." To address these problems, the Task Group recommended that policy and procedures be established to provide for the voluntary or involuntary release of personnel unsuited (by choice and/or performance) for naval service.

VOLOUT I

In May, 1975, Pers-84 personnel briefed the Chief of Naval Personnel (CNP) concerning enlisted personnel attrition problems. As a result, CNP approved research plans aimed at determining whether it was possible: (1) to frontload first-term enlisted attrition among general detail

(GENDET)[1] personnel, and (2) to identify, document, and quantify why first-term attritees become disenchanted in an all-volunteer environment (as reflected in their high attrition rate). He requested that a detailed plan of action and milestones (POA&M) for the implementation of a voluntary separation pilot program be prepared in order to analyze these growing problems. Consequently, in August 1975, Pers-84 requested Navy Personnel Research and Development Center (NPRDC) to prepare this POA&M, and a detailed research plan covering program concept, report schedule, and action date milestones; approval was granted to initiate the pilot program in January 1976. NPRDC was designated to act as primary manager for conduct of the study, data collection, and analysis stages; and Pers-8, to act as primary agent for CNP for coordinating and monitoring.

The major objectives of the pilot program initiated in January 1976 (VOLOUT I) were:

1. To compare attrition rates, performance ratings, and disciplinary records of personnel holding a voluntary

---

[1] Those who attend Apprentice School (i.e., for Seamen, Firemen, and Airmen) rather than "A" school. Apprentice training is approximately a 2-week program designed to prepare enlisted personnel for general detail fleet assignments (i.e., unskilled or semiskilled duty) as Seamen, Airmen, or Firemen. "A" schools provide at least 4 weeks of basic technical and skill training in the Navy's various job specialities, thus preparing trainees to work in a specific Navy rating [Guthrie, Lakota, & Matlock, 1978].

release option with those of matched control personnel not holding the option.

2. To determine how demographic (e.g., age, race, quality index, etc.) and situational (e.g., entering rate) variables affect attrition. This included assessment of the impact of accepting for enlistment a sample of recruits who ordinarily would not have met minimum recruiting standards based on educational level and mental group scores (those classified as DELTAs, i.e., nonhigh school graduates receiving scores of 31 or below on the enlistment screening mental test, the Armed Services Vocational Aptitude Battery).

The conduct of the VOLOUT I study was as follows. All male USN non-prior service apprentices with January 1976 current enlisted dates (CEDs) (N = 1165) were designated as the experimental group, and all similar apprentices with February 1976 CEDs (N = 973) served as the control group. The experimental group included 382 recruits classified as DELTA; the control group included 318. The two groups, thus, were composed almost exclusively of general detail (GENDET) destined apprentices. In the Navy, GENDETs have historically shown the highest incidence of disciplinary and administrative problems [Guthrie, et al., 1978].

Following recruit training, all subjects reported for apprenticeship training, a program designed to prepare them for their fleet duties. During the last week of this training, experimental subjects only were told that they had

been selected to participate in a program studying the effects of voluntary discharge from the Navy. Under this program, subjects could employ a voluntary separation option to be discharged immediately during the period between completion of apprenticeship training and completion of 180 days of total active duty. After 180 days of active service had been completed, they could request voluntary separation by giving the Navy six months notice of intention to separate [Guthrie et al., 1978].

Analysis of the attrition differences between the experimental and control groups showed that 23 months after enlistment attrition was significantly higher in the experimental than in the control group (73% vs. 48%). It was concluded from the VOLOUT I results that a blanket VOLOUT option is probably not a prudent mechanism for controlling or front-loading general detail attrition (nearly three quarters of the experimental group members was lost by the midpoint of their four-year enlistment) [Guthrie et al., 1978].

VOLOUT II

At a 30 September 1976 VOLOUT I (Phase I) briefing to the Chief of Naval Personnel, VADM James D. Watkins, CNP requested that a specific proposal be developed for a follow-on pilot program to validate the concepts of VOLOUT I in terms of Navy-wide application, including "A" school graduates. (This briefing took place before the losses from VOLOUT I looked so awesome.) Accordingly, NPRDC submitted a proposal

based on: (1) use of November 1976 accessions, with the first- and fourth-week accessions serving as the control group and the second- and third-week accessions serving as the experimental group, (2) inclusion of only USN, nonprior service asscessions, excluding Philippine nationals (estimated at 6200 men, 250 women), (3) "A" school "payback" requirements based on specific schools, and (4) methodology, tracking, and control as employed in VOLOUT I. In October 1976, the proposal for a second VOLOUT pilot as summarized above was forwarded from the Assistant Chief for Personnel Planning and Programming to CNP with the recommendation that the proposed study be approved.

Subsequently, NPRDC submitted a POA&M covering program concept, report schedule, and action date milestones. This POA&M was forwarded to CNP and approval was granted to initiate VOLOUT II in November 1976. NPRDC was designated to act as primary manager for conduct of the study, data collection, and data analysis phases. Pers-8 was designated as primary agent for CNP for coordination and monitoring.

The original objectives of VOLOUT II [Note 3] were:

1. To compare attrition rates, performance ratings, and disciplinary records of personnel holding a voluntary release option with those of matched control personnel not holding the option.

2. To attempt to validate VOLOUT I's findings about general detail men and to extend investigation to women

(both general detail and A-school trained) and to A-school trained men.

3. To attempt to validate VOLOUT I findings regarding the impact of demographic and situational variables on attrition among general detail men and to extend these analyses to include women and A-school trained men.

Objective

Owing to the high loss rate experienced in the VOLOUT I experimental group [Guthrie et al., 1978], and similar turnover of the VOLOUT II personnel, the voluntary release pilot program was considered ineffective as a counter-attrition strategy. Because of the undesirable effects of the introduction of such an employment agreement into the military, the long term tracking of study group personnel was terminated in October 1978, at 23 months of service, and none of the VOLOUT II findings was published by NPRDC.

The purpose of this thesis was to take advantage of the rich cohort data file and, in part, fulfill the original VOLOUT II program objectives. By matching social security numbers of the personnel in the experimental and control groups with the Defense Manpower Data Center (DMDC) enlisted master file, the tracking data were extended to 34 months of active military service. The initial objective of this thesis was to compare the long term attrition rates of personnel holding a voluntary release option with those of matched control personnel not holding the option. An attempt

was made to determine the relationships of various situational factors as well as the typical demographic variables with non-prior-service male enlisted personnel attrition. Finally, these personal and organizational factors were investigated using data from both general detail and Navy A school personnel in an attempt to evaluate recruit screening and placement methods.

METHOD

Program Concept

The program concept, as outlined in the Plan of Action and Milestones (POA&M) prepared by NPRDC [Guthrie, Note 4] appears below:

1. The study cohort will be composed of all November 1976 nonprior service male and female accessions.

2. The control group will not have the option of voluntary separation and will include the following Current Enlistment Dates: 1 November through 7 November 1976 and 21 November through 28 November 1976.

3. The experimental group will have the voluntary release option as outlined below and will include the following Current Enlistment Dates: 8-20 November 1976.

Subjects

In accordance with the above concept, the experimental group (N = 2257) included all male nonprior service recruits who enlisted in the regular Navy for 4-year terms of active duty during the period 8-20 November 1976. The control group (N = 2140) included all similar male recruits who enlisted during the periods 1-7 and 21-28 November 1976 (excluding women).[2]

---

[2] Due to the small sample size of women (N = 201) it was decided by these investigators to leave them out of the initial study sample. However, they were included in the regression analysis.

The cohort data for the study were obtained from the NPRDC (Navy Personnel Research and Development Center; San Diego, California) VOLOUT II file. Because Navy funding of the VOLOUT research program was discontinued, it was necessary to update the file with current attrition data on both the control and experimental groups. The NPRDC file allowed attrition tracking of personnel to October of 1978, but with the addition of the DMDC (Defense Manpower Data Center; Monterey, California) Enlisted Master Record[3] (through matching of social security numbers) it was possible to update attrition information to September of 1979 (34 months of service). In addition to updated attrition information, the DMDC cohort file provided other variables such as marital status/dependents (at entry), ISC (Inter-service separation code), age at entry, and census region (entry).

Constraints or Limitations

No sample during any particular 4-week period of time should be expected to profile exactly the characteristics of an entire year's input to the Navy. Potentially significant seasonable differences which may affect the characteristics of entering cohorts include proximity to high school graduation,

---

[3] The initial sample size was 4487 but 90 cases could not be matched (through matching of social security numbers) so they were excluded from the sample (control plus experimental) which brought the final sample down to 4397 cases.

presence of holiday periods, and weather. The last two of these, in particular, may exert some influence in determining subject characteristics within this study. The November cohort will be in recruit training during the Christmas season. Only those in the study with CEDs of 1 November through 12 November are automatically eligible to go home for the holidays. Differences may be hypothesized between those who go home and those who remain at the RTCs, both in terms of the effect of that difference on attrition and possible individual differences attributable to joining at a time which necessitates spending the holidays at boot camp. The experimental and control groups in this study were so selected that both those eligible and not eligible to leave the RTCs for the holidays will be represented and identified in both groups. Thus, it was possible to control for this effect [Guthrie, Note 5].

Procedure

During Fleet Week,[4] experimental subjects only were informed that they had been selected to participate in a program studying voluntary discharge from the Navy, and that this selection was based on the date of their enlistment.

---

[4] In 1976, Fleet Week was held the last week of Navy recruit training. During most of this eighth week the recruits changed out of their working uniforms into the uniform of the day, and practical ship boarding procedures, traditional courtesies bestowed on the quarterdeck, shipboard casualty and emergency drills, etc. [Littlemyer, Note 6].

They were assured that their participation in the program would not affect their Navy careers (i.e., duty stations, job assignments, promotions, etc.), and that the only difference between them and other enlisted personnel was that they could leave the Navy if they wished. In this regard, experimental subjects had the following options as outlined in a 21 December 1976 memo from the Assistant Chief for Personnel Planning and Programming [Note 7]:

Non A school attendees

Voluntary separation could occur:

a. At any time subsequent to completion of recruit training and prior to completion of 180 days total active duty.

b. After 180 days total active duty, individuals could voluntarily separate on six months notice, subject to:

(1) Completion of current deployment.

(2) Service of minimum designated time if on overseas station.

(3) Completion of any "payback" time required by special training programs.

A school training $\leq$ 9 weeks

Voluntary separation could occur:

a. As in paragraph a. above.

b. As in paragraphs b.(1), (2), and (3) above.

c. A-school graduate with accelerated advancement received: after the required one-year payback for the accelerated

advancement to E-4 and the payback accrued from training (exact payback schedule included in Appendix A), a service member could voluntarily separate with six month's notice.

A school training > 9 weeks

Voluntary separation could occur:

a. No accelerated advancement received: payback time (Appendix A) plus six months' notice (computed from A school graduation or drop date). The conditions of paragraphs b.(1) and (2) were also applicable.

b. A-school accelerated advancement received: A school payback time plus one year (accelerated advancement payback) plus six months notice, computed from A-school graduation date. The conditions of paragraphs b.(1) and (2) were also applicable.

For those individuals who transferred from one A-school to another, training time for payback purposes was the aggregate of all post-RTC training received. Commanding Officers had the authority to discharge individuals prior to expiration of their six months notice if such early discharge appeared beneficial to the command.

As in VOLOUT I, requests for voluntary separation were subject to the following constraints:

1. A subject deployed on a cruise could not be separated until he had returned to the United States.

2. A subject stationed overseas could not be separated until he had completed a minimum tour of overseas duty.

3. Under emergency conditions, a subject's voluntary separation option could be withdrawn as necessary, as determined by the Bureau of Naval Personnel (BUPERS).

4. In no circumstances could a service member use the voluntary separation option to escape prosecution under the UCMJ.

Service members separated under the provisions of the voluntary separation pilot program received an honorable discharge unless the character of their service record indicated otherwise. In addition, they were assigned a reenlistment code of RE-4 (indicating that they are not eligible to reenlist without prior BUPERS approval), and a discharge code of KCC (general demobilization--reduction in authorized strength). These codes were employed to facilitate long-term tracking of personnel who exercised their voluntary release option.

Analyses

The total study group was divided on two dimensions to permit a number of different comparisons. Intially the VOLOUT and control groups were compared as to input (e.g., years of education) and situational (e.g., type of assignment) differences, and overall attrition differences between the groups were determined; in addition, attrition comparisons were made between the experimental and control groups using input and situational variables to attempt to predict attrition from the group.

The input and situational variables considered in this study included the following: age at enlistment (17 years, 18 years, 19-20 years, 21 years or older); race (white vs. nonwhite); dependents (none vs. one or more); years of education completed (10 or fewer, 11, 12, and more than 12); educational certification (non-graduate, GED,[5] high school diploma graduate); Recruit Quality Index (Alpha: high school graduate/school qualified;[6] Bravo: non-graduate/school qualified; Charlie: high school graduate/non-school qualified; Delta: non-graduate/non-school qualified): Recruit Training Command attended (San Diego, Great Lakes, Orlando); Mental Group (described in Table 3); initial fleet assignment (e.g., Carrier Duty); Navy School status (GENDET/NONGENDET); GENDET ratings (Firemen, Seamen, Airmen); and A school ratings (see Table 1 for further explanation of variables).

Data Analysis

Initial data analyses involved crosstabulation of the input and situational variables with: study group (control or

---

[5] GENERAL EDUCATION DEVELOPMENT TEST. Used to determine if applicant has a high school equivalency. The GED tests are designed to measure as accurately as possible the major and lasting outcomes generally associated with four years of regular high school instruction. The GED test battery contains five tests: writing skills, social studies, science, reading skills, and mathematics. Minimum score requirements vary slightly between the states, but generally an applicant must score at least in the 31st percentile to receive a GED [Note 8].

[6] In this context, "school qualified" means the individual scored in mental group III upper or higher. See Table 3 for a description of mental groups.

experimental), and attrition data (e.g., percentage lost during the first 12 months of enlistment).

Additional data analyses were conducted by attempting to predict attrition within the framework of multiple linear regression. Two basic types of equations were developed. The "traditional" equations were based on the attrition predictors identified by Robert F. Lockman [1976] and others. These variables included: race, mental group, age, number of dependents, and whether or not the individual had graduated from high school. Additionally, other equations were developed that included the traditional variables, plus variables such as school status and initial fleet assignment (defined in Table 1).

Table 1

Definition of Demographic and Situational Variables

Variable	Definition
Age	Age at enlistment (17 up to and including 17.5 = 17; all values greater than 17.5 up to and including 18.5 - 18, etc.)
Number of dependents	The number of dependents at entry into the service.
Years of education	Years of education, including year currently attending.
Recruit Quality Index (RQI)	An index that classifies Navy applicants using four quality indices, Alpha, Bravo, Charlie, and Delta (Explained in detail in Chapter 3).
Initial Duty Assignment	
Shipboard Duty (Ship)	Defined as assignment either to a service ship, amphibious ship, or cruiser/destroyer.
Submarine	Assigned to submarine duty.
Carrier duty (CV)	Assigned to carrier duty.
Shore	Assigned to stateside or overseas shore duty.
Other Sea	Sea duty assignment other than those specifically delineated; i.e., service, amphibian or cruiser/destroyer class ships, aircraft carriers or possibly air squadrons.
Air Squadron	Assigned to an aviation squadron unit.
GENDET	General detail, unrated personnel (see Footnote 1, Chapter 1 for a detailed description).

Table 1 (Continued)

NONGENDET (A school)	A school attendees who receive specialized training (see Footnote 1, Chapter 1 for a detailed description).

NOTE: Separate definitions will be given for the variables used in the regression analyses (see Chapter 4).

DEMOGRAPHIC AND SITUATIONAL VARIABLES

One of the primary objectives of this study was to examine the relationships of various personal and organizational factors with enlisted personnel attrition. Because this cohort analysis is used with both the test and the control study groups, an evaluation of the homogeneity of the two samples must be conducted. In this section, the experimental and control groups are compared with demographic and situational variables (defined in Table 1). Particular attention has been devoted to comparisons of GENDET and NONGENDET (A School) personnel. They were compared on the recruit quality index, age, race, and number of dependents. Additionally, the GENDET-NONGENDET personnel were compared by race across recruit quality indices and age to investigate whether or not there had been any racial bias in A school selection.

The results of the cross tabulations presented in the next section will be valuable in later sections which investigate experimental and control groups attrition differentials.

Comparison of Experimental and Control Groups on Demographic Variables

Table 2, which provides demographic data for both experimental and control groups, indicates that there were no significant differences between them as to racial composition and mental group distribution. As shown, approximately 85% of

Table 2

Comparison of Experimental and Control Groups on Demographic Variables

	Exper. Group		Control Group		Total	
Variable	N	Percent	N	Percent	N	Percent
Age at Enlistment--χ^2 (3df) = 13.36; p < .01*						
17 Years Old	201	8.9	148	6.9	349	7.9
18 Years Old	612	27.1	536	25.0	1148	26.1
19-20 Years Old	960	42.5	1014	47.4	1974	44.9
≥21 Years Old	484	21.4	442	20.7	926	21.1
Total	2257	99.9	2140	100.0	4397	100.0
Racial Composition--χ^2 (1df) = < 1; p > .45						
White	1911	84.7	1829	85.5	3740	85.1
Non-White	346	15.3	311	14.5	657	14.9
Total	2257	100.0	2140	100.0	4397	100.0
Number of Dependents--χ^2 (1df) = 2.75; p > .05						
None	2137	94.7	2000	93.5	4137	94.1
One or More	120	5.3	140	6.5	260	5.9
Total	2257	100.0	2140	100.0	4397	100.0
Years of Formal Education Completed--χ^2 (3df) = 13.36; p < .005*						
10 Years or Less	322	14.3	266	12.4	588	13.4
11 Years	399	17.7	316	14.8	715	16.3
12 Years	1350	59.8	1390	65.0	2740	62.3
>12 Years	186	8.2	168	7.9	354	8.1
Total	2257	100.0	2140	100.1	4397	100.1

Table 2 (Continued)

	Exper. Group		Control Group		Total	
Variable	N	Percent	N	Percent	N	Percent
Educational Certificate Attained--χ^2(3df) = 28.86; p < .001*						
None	524	23.2	384	17.9	908	20.7
GED	207	9.2	172	8.0	379	8.6
HSDG	1472	65.2	1551	72.5	3023	68.8
H.S.+	54	2.4	33	1.5	87	2.0
Total	2257	100.0	2140	99.9	4397	100.1
Mental Group Category--χ^2(4df) = 3.30; p > .5						
I	107	4.7	119	5.6	226	5.1
II	765	33.9	742	34.7	1507	34.3
III (Upper)	740	32.8	708	33.1	1448	33.0
III (Lower)	593	26.3	530	24.8	1123	25.6
IV (Upper)	49	2.2	39	1.8	88	2.0
Total[a]	2254	100.0	2138	100.1	4397	100.0
Recruit Quality Index--χ^2(3df) = 23.50; p < .001*						
Alpha	1285	56.9	1302	60.8	2587	58.8
Bravo	327	14.5	267	12.5	594	13.5
Charlie	448	19.8	454	21.2	902	20.5
Delta	197	8.7	117	5.5	314	7.1
Total	2257	99.9	2140	100.0	4397	99.9

[a] Mental Group missing observations = 5.

*χ^2 test of independence is statistically significant, i.e., the experimental and control groups differ significantly on this variable.

each group was white, and 15% black or other racial minorities. In regard to mental group, enlisted accessions were assigned to categories based on their Armed Services Vocational Aptitude Battery (ASVAB) Armed Forces Qualification Test (AFQT) scores as shown in Table 3.

Table 3

Mental Group Definitions in Terms of AFQT Scores

Mental Group	ASVAB AFQT Scores
I	93+
II	65-92
III upper (IIIU)	49-64
III lower (IIIL)	31-48
IV upper (IVU)	21-30

As shown in Table 2, approximately 72% of the experimental and control group subjects fell into the upper (I, II, IIIU) mental groups, while about 28% fell into the lower (IIIL, IV) categories.

In contrast to the above variables, significant differences were found between the experimental and control groups in terms of age, years of formal education completed, educational certification, and the recruit quality index. These differences, which also are shown in Table 2, are discussed in the following paragraphs.

Age at Enlistment

For this study age was defined as age at nearest birthday, i.e., 17 up to and including 17.5 = 17, all values greater than 17.5 up and including 18.5 = 18, etc. In comparison to the control group, significantly more of the experimental group enlisted at age 17 and 18 (36.0 vs. 31.9%; $Z = 2.87$, $p < .01$), and significantly less at age 19 and 20 (42.5 vs. 47.4%; $Z = 3.27$, $p < .01$).[7] Approximately 21% of each group enlisted at age 21 and older.

Number of Dependents

In comparison to the control group, the experimental group had fewer personnel who had one or more dependents (5.3 vs. 6.5%). However, this difference was not statistically significant (χ^2, 1df, 2.75, $p > .05$).

Years of Formal Education Completed

Compared to the control group, the experimental group had significantly more subjects who had completed 11 years or less of education (32.0 vs. 27.2%; $Z = 3.48$; $p < .01$) and fewer personnel who had completed 12 years or more of formal education (68.0 vs. 72.9%; $Z = 3.56$, $p < .01$).

Educational Certificate Attained

In agreement with years of education completed, the experimental group had more subjects who held no certificate

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[7] Differences between percentages throughout this thesis were tested for statistical significance at the .05 level using the proportion test given in Appendix B.

(neither diploma nor GED), 23.2 vs. 17.9%; Z = 4.34, $p < .01$, and fewer personnel who held high school diplomas or advanced degrees (67.6 vs. 74.0%; Z = 4.66, $p < .01$). There was no statistically significant difference between the percentage of experimental and percentage of control group personnel holding GED certificates (9.2 vs. 8.0%; Z = 1.42, $p > .16$).

Comparison of Years Education and Certificate Attained

A comparison of years of formal education and educational certificate attained in Table 2 seem to uncover disparities for certain categories. For example, the number of personnel with 12 years of education and more than 12 years appear incongruous with their obvious counterparts of high school diploma graduates and high school plus personnel. It should be noted that these are separate Enlisted Master Record (EMR) data entries that most probably were initially self reported in the AFEES (Armed Forces Entrance and Examining Station). Table 2 total group data for 12 years of education and high school graduates (2740 vs. 3023, respectively) compared favorably with June, 1980, EMR file updates (328,000 vs. 344,000, respectively) [Wilson, Note 9]. The most plausible explanation was that personnel with 13 or more years of education still reported themselves as high school graduates. Cross tabulations for the total sample revealed that high school graduates did not always report 12 years of education; i.e., 4.3 percent of those with 11 years of education and 8.9 percent of those with more than 12 years were reported

as high school graduates. Some of those high school graduates who reported completion of 11 years of education may have completed their degree requirements early, and those graduates who reported 13 years of education may have failed and had to make-up an extra year of school. Another area worthy of note was the fact that 76 percent of the total group of personnel reporting thirteen years or more of education also selected high school diploma as their highest level of education attained. These examples are but a few of the possible permutations that seem to muddle logical comparisons in educational achievements. However, these apparent oddities in the self-reported data have always existed and barring any future changes in AFEES data format, all statistical inferences such as regression analyses should remain sound.

Recruit Quality Index

Navy applicants are sometimes classified (for reporting purposes only) using four quality indices, ALPHA, BRAVO, CHARLIE, DELTA, according to their AFQT scores and educational attainments. Those that attained AFQT scores of at least 49 (also corresponds to mental groups IIIU and higher) can be classified as Navy "A" school eligibles (SE), and the remainder are not "A" school eligible (NSE). These groups can be further divided by whether they are certified high school graduates or GED equivalent (HSG) or recruits that have not finished high school (NHSG). The categories may be depicted

as follows [Northrup, DiAntonio, Brinker, & Daniel, 1979, p. 51]:

	HSG	NHSG
SE	A	B
NSE	C	D

Since educational level is one of the two determinants in assigning recruits to quality indices, the distribution reflects the differences discussed above concerning educational attainment. In comparison to the control group, significantly fewer experimental group subjects were classified as As and Cs (HSG) (76.7 vs. 82.0%; $Z = 4.33$, $p < .01$), and more as Bs and Ds (NHSG) (23.2 vs. 18.0%; $Z = 42.6$, $p < .01$).

The Navy Recruiting Command also defines school eligible as a "quality measure definition for reporting purposes which DOES NOT determine whether an applicant can be enlisted in a school program" [Recruiting, 1979]. A "school eligible" applicant is defined as an enlistee who has attained one of the following:

(1) An AFQT score of 49 or greater on the ASVAB, or

(2) A combined WK (word knowledge) plus AR (arithmetic reasoning) of 100 or greater on the ASVAB, or

(3) Qualification for and enlistment in a program that guaranteed Class "A" School training by meeting the ASVAB score qualifications with or without the score waiver, for

the program in which enlisted as specified in the applicable program.

Comparison of Experimental and Control Groups on Situational Variables

Table 4 presents the comparisons made between the experimental and control groups on the situational variables. As shown, the study groups included similar percentages of Firemen, Airmen, and Seamen. Additionally, similar proportions or the experimental and control groups attended the three Recruit Training Commands (RTCs). There were significant differences between the two groups in initial duty assignment and in the number of personnel attending Navy A school. These differences, which also appear in Table 4, are discussed below.

Initial Duty Assignment

Generally, a higher porportion of control group than experimental group was originally assigned to sea-going units, namely air squadrons, ships, and submarines; and a lower proportion was assigned to shore stations.

School Assignment

In comparison to the control group, the experimental group had fewer personnel who were assigned to Navy A schools (45.5 vs. 65.0%; χ^2, 1df, 167.92, $p < .001$). Consequently, the experimental group had a significantly higher proportion of general detail (GENDET) personnel than did the control group.

Table 4

Comparison of Experimental and Control Groups on Situational Variables

	Exper. Group		Control Group		Total	
Item	N	Percent	N	Percent	N	Percent
Entering Rate--χ^2(2df) = 4.03; $p > .10$						
Firemen	241	19.6	159	21.2	400	20.2
Airmen	170	13.8	123	16.4	293	14.8
Seamen	819	66.6	467	62.3	1286	65.0
Total	1230	100.0	749	99.9	1979	100.0
Recruit Training Command Attended--χ^2(2df) = 1.95; $p > .37$						
San Diego	601	27.9	573	27.0	1174	27.5
Great Lakes	880	40.8	841	39.7	1721	40.3
Orlando	674	31.3	705	33.3	1379	32.3
Total	2155	100.0	2119	100.0	4274	100.1
Initial Duty Assignment--χ^2(5df) = 13.34; $p < .05$*						
Air Squadron	106	6.0	137	7.2	243	6.6
Ship	568	32.4	656	34.5	1224	33.5
Submarine	101	5.8	146	7.7	247	6.8
CV	180	10.3	176	9.3	356	9.7
Shore	643	36.7	620	32.6	1263	34.6
Sea	155	8.8	167	8.8	322	8.8
Total	1753	100.0	1902	100.1	3655	100.0

Table 4 (Continued)

Item	Exper. Group N	Exper. Group Percent	Control Group N	Control Group Percent	Total N	Total Percent
School Assignment--χ^2(1df) = 167.92; p < .001*						
A School	1027	45.5	1391	65.0	2418	51.3
GENDET	1230	54.5	749	35.0	1979	48.7
Total	2257	100.0	2140	100.0	4397	100.0

NOTE: For initial fleet assignment, 742 were not given an initial assignment and thus were likely to be ones who attrited early. A few recruits (N=64) did not have a coded initial assignment since they received an assignment after the initial assignment data were compiled.

*χ^2 test of independence is statistically significant, i.e., the experimental and control groups differ significantly on this variable.

Comparison of GENDET/NONGENDET Personnel on Demographic Variables

Recruit Quality Index

As shown in Table 5, Alpha recruits are significantly more likely to be found in NONGENDET (A school) school assignments (71.8%) than in GENDET school assignments (43.0%) ($Z = 19.31$, $p < .01$). This was expected, since Alpha recruits, having higher AFQT scores and a high school degree, would be in demand for A school assignments since these schools require more learning skills than do non-specialized GENDET assignments. Surprisingly, however, only 67.1 percent (68.9% if GED's are excluded) of the Alpha recruits are assigned to A schools compared to 46 percent (49% if GED's are excluded) of the supposedly non-school eligible Charlie recruits ($Z = 11.22$, $p < .01$). In fact these Charlie recruits have a significantly higher participation rate in A schools than the Bravo recruits (46.0 vs. 36.4%; $Z = 3.68$, $p < .01$) who are supposedly school eligible. Even some Deltas were sent to A School; they made up 7.1% of the A school students.

Age at Enlistment

Table 5 shows that age is significantly related to A school assignment. The lowest A school participation rate was for 17 year old recruits (34.7%) while the highest was for recruits 21 years or older (59.0%, $Z = 7.75$; $p < .01$). One possible explanation is that older recruits have more experience and greater knowledge of the labor market, and thus, are more aware of the importance of specialized training.

Table 5

Comparison of GENDET/NONGENDET Personnel on Demographic Variables

Item	NONGENDET N	NONGENDET Percent	GENDET N	GENDET Percent	NONGENDET Participation Rate (%)	Total N	Total Percent
Recruit Quality Index--χ^2(3df) = 460.66; $p < .001$*							
Alpha	1737	71.8	850	43.0	67.1	2587	58.8
Bravo	216	8.9	378	19.1	36.4	594	13.5
Charlie	415	17.2	487	24.6	46.0	902	20.5
Delta	50	2.1	264	13.3	15.9	314	7.1
Total	2418	100.0	1979	100.0	55.0	4397	99.9
Age of Recruit at Entry--χ^2(3df) = 69.96; $p < .001$*							
17 Years Old	121	5.0	228	11.5	34.7	349	7.9
18 Years Old	616	25.5	532	26.9	53.7	1148	26.1
19-20 Years Old	1135	46.9	839	42.4	57.5	1974	44.9
≥21 Years Old	546	22.6	380	19.2	59.0	926	21.1
Total	2418	100.0	1979	100.0	55.0	4397	100.0
Race--χ^2(1df) = 10.33; $p < .005$*							
Nonwhite	323	13.4	334	16.9	49.2	657	14.9
White	2095	86.6	1645	83.1	56.0	3740	85.1
Total	2418	100.0	1979	100.0	55.0	4397	100.0

Table 5 (Continued)

Item	NONGENDET		GENDET		NONGENDET Participation Rate (%)	Total	
	N	Percent	N	Percent		N	Percent
Number of Dependents—χ^2(1df) = .924; p > .3							
None	2283	94.4	1854	93.7	55.2	4137	94.1
One or More	135	5.6	125	6.3	51.9	260	5.9
Total	2418	100.0	1979	100.0	55.0	4397	100.0

NOTE: 379 of the personnel classified as high school graduates were in fact GED holders.

*χ^2 test of independence is statistically significant, i.e., the groups differ significantly on this variable.

In fact, age may well be a proxy for such factors as mental group, high school diploma graduate and the like. As discussed later in Chapter 4, age is highly correlated to several other explanatory variables that may all to some degree measure the maturity of the recruit and could possibly be combined statistically in future research. For example, the data in this study show that 76 percent of the high school graduates and 82 percent of the mental group I category are 19 years of age or older. Older recruits may be more willing to delay entry into the service in order to get an A school seat.

Racial Composition

As expected, nonwhites (49.2%) participated significantly less than whites (56.0 %) in A school training (χ^2, 1df, 10.33, $p < .005$). This was expected since nonwhites, on average have lower AFQT scores than do whites, reflecting the heavy concentration of minorities in the lower mental group categories [Northrup et al., 1979]. Many reasons have been offered by Northrup et al., for these test score differences: quality of education, lack of familiarity with standardized test taking methods, and language or other communications problems.

Number of Dependents

Table 5 shows no significant difference between a recruit's claimed number of dependents and his likelihood of being selected for A school. Recruits with no dependents and

recruits with dependents were selected for Navy A school in similar proportions (55.2 vs. 51.9%; χ^2, 1df, .924, $p > .30$).

Comparison of GENDET/NONGENDET Personnel by Race

Recruit Quality Index

In the previous section, nonwhites were shown to participate less in A schools as often (see Table 5) as their white counterparts (49.2% nonwhite participation rate vs. a 56% white participation rate in A schools). Since one of the primary determinants of school eligibility, as operationally defined in terms of recruit quality index, is the applicant's AFQT score, the differing A school participation rates seemed reasonable. As derived from Table 6, 77.2 percent of the whites and 44.6 percent of the nonwhites in this study were school eligible in regard to the recruit quality index (i.e., they were either As or Bs). In a sample of essentially all calendar year 1973 nonprior service enlisted males, Sands [1977] found that while there "is little difference between the percentages of majority and minority high school graduates (71 vs. 68%), there was a marked difference between the percentages of those qualifying as school eligible (71 vs. 35%)" ($p < .01$). Data from this thesis are similar with a small difference in white-nonwhite high school graduates (68.9 vs. 67.9%), yet a large difference in school eligible as mentioned above (77.2 vs. 44.6%). However, when disaggregated by the

Table 6

Comparison of GENDET/NONGENDET Personnel by Recruit Quality Index on Race

	Recruit Quality Index									
	Alpha		Bravo		Charlie		Delta		Total	
Item	N	Percent	N	Percent	N	Percent	N	Percent	N	Percent
Nonwhite Distribution -- χ^2(3df) -- 75.55; $p < .001$*										
A School	157	67.7	22	36.1	131	47.0	13	15.3	323	49.2
GENDET	75	32.3	39	63.9	148	53.0	72	84.7	334	50.8
Total	232	100.0	61	100.0	279	100.0	85	100.0	657	100.0
White Distribution -- χ^2(3df) -- 375.68; $p < .001$*										
A School	1580	67.1	194	36.4	284	45.6	37	16.2	2095	56.0
GENDET	775	32.9	339	63.6	339	54.4	192	83.8	1645	44.0
Total	2355	100.0	533	100.0	623	100.0	229	100.0	3740	100.0
Total Distribution -- χ^2(3df) -- 460.66; $p < .001$*										
A School	1737	67.1	216	36.4	415	46.0	50	15.9	2418	52.6
GENDET	850	32.9	378	63.6	487	54.0	264	84.1	1979	47.4
Total	2287	100.0	594	100.0	902	100.0	314	100.0	4397	100.0

*χ^2 test of independence is statistically significant, i.e., the groups differ significantly on this variable.

Recruit Quality Index, A school participation rates are quite similar. Table 6 shows that nonwhite and white recruits in the Alpha category have almost identical participation rates in A school (67.7% vs. 67.1% respectively). The A school participation rates of white and nonwhite Bravo recruits are also quite close, with a participation rate of 36.4% for whites and a rate of 36.1% for nonwhites. Charlie A-school participation rates are 45.6% for whites and 47.0% for nonwhites. Deltas are also fairly close in nonwhite-white A-school participation rates, with 16.2% of the white Deltas assigned to A school, while 15.3% of the nonwhites were assigned to A school. It is recognized that "school eligible" is a quality measure only, and does not necessarily guarantee that a recruit so designated will be sent to A school. Still, it is interesting to note the differences in "school eligible" when compared to A school participation controlled for race. While 77.2 percent of the whites were eligible, only 56.0 percent participated, and 44.6 percent of the nonwhites were eligible with 49.2 percent participating. At first investigation, there seems to be a discrepancy between the closeness of the recruit quality index participation rate by race, and the apparent low (56.0%) participation rate of white school eligibles. However, though there is only a .6 percent difference between white Alpha A school participation and the nonwhite A school participation rate, the .6 difference (67.7 vs. 67.1%), if it did not exist, would result

in an A school participation rate for white school eligibles of 62 percent (from 56%). This apparent paradox results from the fact that white Alphas constitute the majority of the white sample (63%) and any slight change in their A-School participation rate would affect the overall school participation rate at a greater rate.

Age at Enlistment

Table 7 shows that as the recruit gets older (of the age groups in the samples), regardless of racial status, he is more likely to be selected for A school. Only 21.2 percent of the 17 year old nonwhites were selected to A school, while nonwhites 21 years or older were selected 57.9 percent of the time for A school. Seventeen year old whites had an A school selection rate of 37.0 percent compared to a rate of 59.3 percent for those 21 years or older.

Summary

In this chapter numerous comparisons have been made between the sample, disaggregated primarily by experimental-control and GENDET-NONGENDET. While the traditional way of approaching the analysis of attrition has been via rates expressed as percentages they are easily misused and misunderstood when calculated for groups which are not homogeneous. As summarized in Table 8 there are several demographical and situational sources of heterogeneity in this sample. Differences between the experimental and control groups might have been expected because of the sampling methods discussed in

Table 7

Comparison of GENDET/NONGENDET Personnel
by Recruit Age at Enlistment on Race

	Age of Student									
	17 Years		18 Years		19-20 Years		$\geq$21 Years		Total	
Item	N	Percent	N	Percent	N	Percent	N	Percent	N	Percent
Total Distribution										
Nonwhite Distribution						--χ^2(3df) = 23.22; p < .001*				
A School	11	21.2	65	45.8	130	49.8	117	57.9	323	49.2
GENDET	41	78.8	77	54.2	131	50.2	85	42.1	334	50.8
Total	52	100.0	142	100.0	261	100.0	202	100.0	647	100.0
White Distribution						--χ^2(3df) = 52.03; p < .001*				
A School	110	37.0	551	54.8	1005	58.7	429	59.3	2095	56.0
GENDET	187	63.0	455	45.2	708	41.3	295	40.7	1645	44.0
Total	294	100.0	1006	100.0	1713	100.0	724	100.0	3740	100.0
Total Distribution						--χ^2(3df) = 69.96; p < .001*				
A School	121	34.7	616	53.7	1135	57.5	546	59.0	2418	55.0
GENDET	228	65.3	532	46.3	839	44.5	380	41.0	1979	45.0
Total	349	100.0	1148	100.0	1974	100.0	926	100.0	4397	100.0

*χ^2 test of independence is statistically significant, i.e., the groups differ significantly on this variable.

Table 8

Summary of Univariate Comparisons Between Experimental-Control Groups and GENDET-NONGENDET (A School) Personnel

	Experimental-Control	GENDET-NONGENDET
Age	Experimental subjects were younger	GENDET subjects younger
Race	No difference	GENDET subjects were more likely to be nonwhite
Number of Dependents	No difference	No difference
Recruit Quality Index	Experimental subjects more likely to be BRAVOs or DELTAs	GENDET subjects were more likely to be BRAVOs and DELTAs
Years of Education	Experimental subjects had fewer years of education	--
Educational Certificate Attained	Experimental subjects were less likely to be high school diploma graduates	--
Mental Group	No difference	--
GENDET/NONGENDET	Experimental subjects were more likely to be assigned to GENDET ratings	--
GENDET Rates (Seamen, Airmen, Firemen)	No difference	--
RTC Attended	No difference	--

Table 8 (Continued)

	Experimental-Control	GENDET-NONGENDET
Initial Duty Assignment	Experimental subjects were more likely to be assigned to shore-duty units than sea-duty units	--

NOTE: In this table "no difference" represents no statistically significant difference at the .05 level. Comparisons between GENDET/NONGENDET personnel were only made for the first four variables.

Chapter 2. Because of difficulties in balancing qualitative constraints, i.e., primarily school eligibles, high school diploma graduates, and minorities, the recruiting system must produce recruits that fit quota goals, enormously complicating the control processes. Since all recruiting districts have this problem of balancing the constraint matrix, the recruiters must resort to "frontloading." That is, recruit the hard ones early in the month, then fill in with the easier categories, e.g., BRAVOs and DELTAs, at the end of the month [Arima, 1976]. The fact that the control group, on average, had better quality recruits despite their fourth week enlistment dates was indeed an anomaly. The most plausible explanation was the unusually high quality mix of potential enlistees that recruiters could select from in the months of November-December 1976. Because of the forthcoming change to a participatroy GI Bill educational assistance program in January 1977, many potential enlistees were "knocking at the door" in hopes of securing the more attractive fully-paid benefits by the end of December. In fact, the monthly enlistments for November and December 1976 were, respectively, 1.5 and 3.5 times the goals for those months [Arima, 1978]. This phenomenon was a manifestation of the change in educational benefits and helps to account for the control recruits being of higher quality than the experimental group personnel. The reader should remain mindful of the differences between the study groups when proceeding to the next chapter. Though attrition over time is compared by one variable at a time in

early sections, regression analyses are conducted later in the chapter to investigate variables simultaneously, thereby controlling for sampling differences.

ATTRITION OF ENLISTED PERSONNEL - RESULTS AND EXPLANATIONS

In this chapter the relationship of various demographical and situational factors to enlisted attrition is examined. Initially, overall attrition over time is compared for the experimental and control group personnel. In subsequent sections of this chapter loss rates over time are compared for both study groups by each demographic and situational variable at a time. To facilitate reader review, summary tables are provided for the attrition-over-time data, however, for more detailed information and ease of comparison with the VOLOUT I report by Guthrie et al., [1978], the reader is invited to see Appendix C. Appendix C may be useful to the reader who wishes a more detailed summary of the data results. Appendix C contains the numbers remaining in each category and the appropriate chi-squares. In addition to the disaggregation by experimental and control groups, some attrition comparisons over time are made for GENDET and NONGENDET control group personnel to enable evaluation of Navy recruit screening methods. Correlation analysis is addressed in the fifth section of this chapter. Correlations reveal the degree to which variation in one variable is related to variation in another. This comparison of the strength of association between variables was an appropriate predecessor to the final section, regression analysis. In the last section,

a number of variables are used simultaneously in a multiple regression to examine their relationship to enlisted attrition.

Overall Attrition

Analyses of cumulative losses month-by-month revealed significant differences between the experimental and control groups in the pattern of losses over time. Length of Service (LOS)[8] differences between the two groups are shown in Figure 1. By the end of the first year, some 40 percent of the experimental group had attrited, compared to 16 percent of the control group. Table 9 provides overall data for both groups and shows that attrition was significantly higher in the experimental group than in the control group. At the end of 34 months, 71.6 percent of the experimental group had attrited, compared to 31.5 percent of the control group. Further, as shown by Figure 1a, it appears that even at 34 months the difference between experimental-control cumulative attrition percentages continues to increase.

Because of the differences in cumulative attrition percentages in Figure 1a, the losses of individuals who already had attained a certain length of service were considered. As adapted from Bartholomew and Forbes [1979], the conditional

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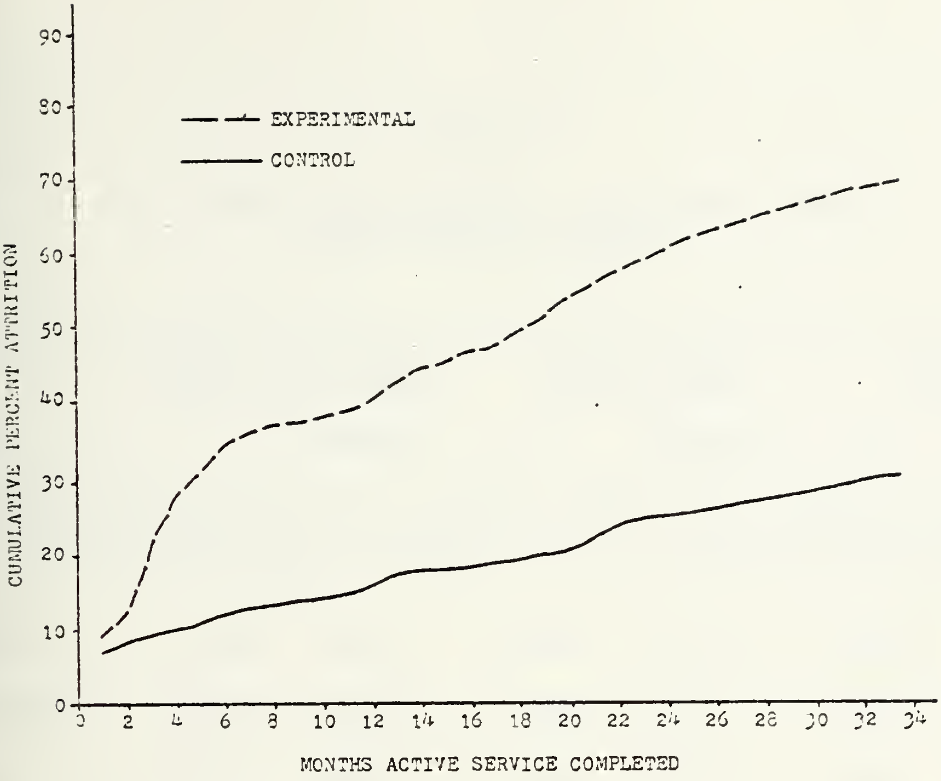
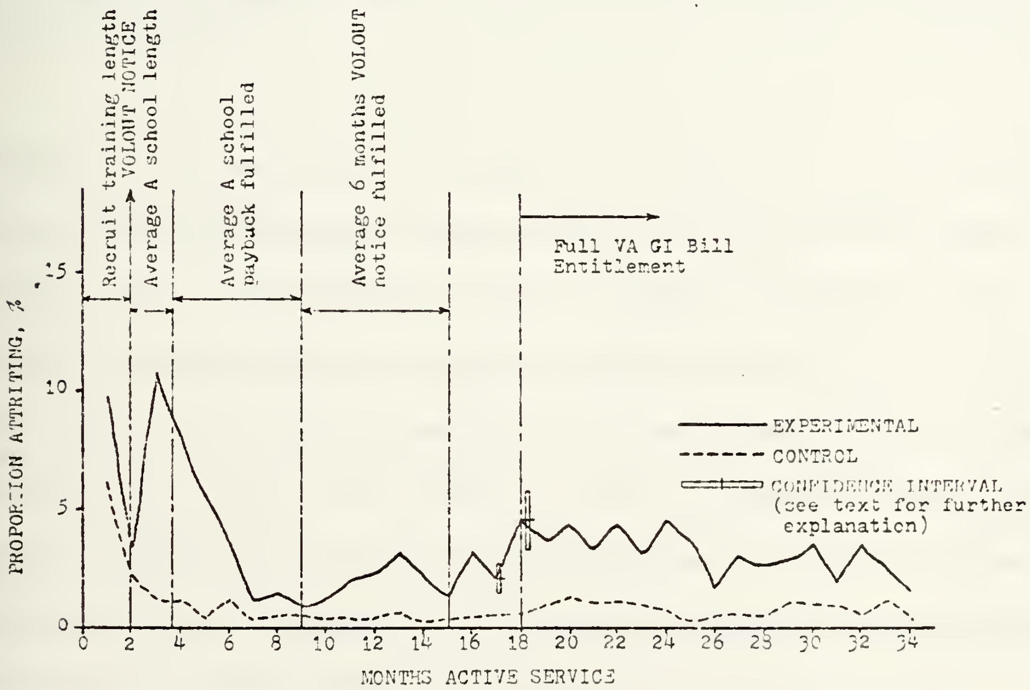
[8] LOS plots exhibit cumulative attrition percentages over time for the different groups disaggregated by demographic or situational variables. The length of service reflects the member's active military service in months, and was computed with the DMDC cohort files by subtracting Basic Active Service Date from the As of Date of the File (September 1979) or the Date of Separation.



a. Cumulative percent attrition



b. Conditional probability of attrition

Figure 1. Overall attrition over time by experimental and control groups

Table 9

Attrition at 34 Months for Experimental and Control Groups

Item	Experimental Group N	Experimental Group Percent	Control Group N	Control Group Percent	Total N	Total Percent
Attrition Rate by Group -- χ^2 (1 df)=703.10, p<.001*						
Active	642	28.4	1465	68.5	2107	47.9
Attrited	1615	71.6	675	31.5	2290	52.1
Total	2257	100.0	2140	100.0	4397	100.0

*χ^2 test of independence is statistically significant, i.e., the experimental and control groups differ significantly on this variable.

probability of leaving at length of service x was computed for both the experimental and control groups and plotted in Figure 1b. The scale on which length of service was measured was divided at monthly intervals, x_1, x_2, ..., x_{33}, and it was known that L_i members of the cohort left in the interval (x_i, x_{i+1}) $(i = 1,2,3,\ldots,33)$. Assuming that individuals' completed lengths of service were uniformly distributed in each interval, the expected proportion of the cohort who will leave in (x_i, x_{i+1}) was L_i/c_iZ_i where $c_i = (x_{i+1} - x_i)$ and Z_i is the number surviving to each of

the times x_i (in this study c_i will always equal one). This may be thought of as an estimate of the probability

$$q_i = \Pr(\text{individual with length of service } x_i\text{, leaves before } x_{i+1}) \quad (i = 1,2,3,\ldots,k)$$

Simply stated, it is the probability of attriting in a given interval, computed as the number of leavers in an interval divided by the number entering the interval. The main advantage of q_i is that, being a probability, it can be interpreted in a direct way as an expected proportion or leaving rate for a given interval.

As shown in Figure 1b, the proportion attriting during the first month of recruit training is, as expected, quite large. Recruits may fail to complete training for medical reasons, inability to absorb instruction, lack of motivation, disciplinary problems, or a variety of administrative causes, such as discharge for fraudulent enlistment or family hardship [Military Manpower Training Report, 1980]. While some trainees are "recycled" or given special instruction for adjustment to military life or slow learning difficulties, it does appear that many losses are incurred early in the course.

Although the interpretation of such plots is necessarily somewhat subjective, average key event time lines have been provided atop the graph to aid in reader use. The average Navy class A school of 6-8 weeks [Catalog of Navy Training Courses,

1978] has been depicted as ending at approximately seven weeks, and the corresponding average payback period of 3-4 months (calculated from Appendix A), and the maximum advanced notice periods are provided in Figure 1b. Differences between the experimental and control groups in the third month are clear, and point to the willingness of many recruits to exercise immediately their VOLOUT option. This marked increase in the propensity to leave following recruit training may suggest an area for further investigation.

A period marked by an increase in the proportion attriting for the experimental group occurred in the eighteenth month for a period of about six months. It is at this point that an eligible person with 18 continuous months or more of active duty is entitled to full educational benefits under the GI Bill [Benefits for Veterans, 1979]. Persons with less than 18 continuous months of service were entitled to $1\frac{1}{2}$ months of full-time benefits for each month of active duty served. While it appears that the estimates themselves as plotted may not be significant the indication of their errors was useful. Since the numbers were large enough (N = 2257) to allow the normality assumption to be used safely for the experimental group, confidence intervals with widths equal to two standard errors were plotted immediately adjacent to various monthly "points," thereby serving as 95 percent confidence

intervals.[9] The probability functions for months 17 and 18 appear well separated and hence significantly different at the .05 level, since the intervals set at two standard errors did not overlap. It appears that the experimental personnel "opted-out" at a significantly higher proportion after having attained full GI Bill entitlements in the eighteenth month.

Attrition by Demographic Variables

Age at Enlistment

As shown in Table 10, the rate of attrition generally appears to decrease as the age of the recruit at enlistment increases. At the 34 month point, experimental group members who enlisted at 17 years of age experienced the highest attrition rate (85.1%); and those who enlisted at 21 years or older, the lowest (66.1%). For control subjects, those who enlisted at 17 years of age had the highest attrition rate (56.1%); and those who enlisted between the ages of 19 and 20, the lowest (27.9%). This same relationship was found by Guthrie et al., (1978). The distribution of losses over time (34 months) for the control and experimental groups are shown in Figure 2.

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[9] Though L_i and Z_i are both random variables, Z_i was treated as given since the probability is only of real interest when the point x_i is reached and Z_i is known [Bartholomew and Forbes, 1979]. Under these circumstances the binomial argument applies and

$$\hat{se}(\hat{q}_i) = [c_i q_i (1 - c_i q_i)/Z_i]^{1/2}/c_i \quad (i = 0,1,2,\ldots,33)$$

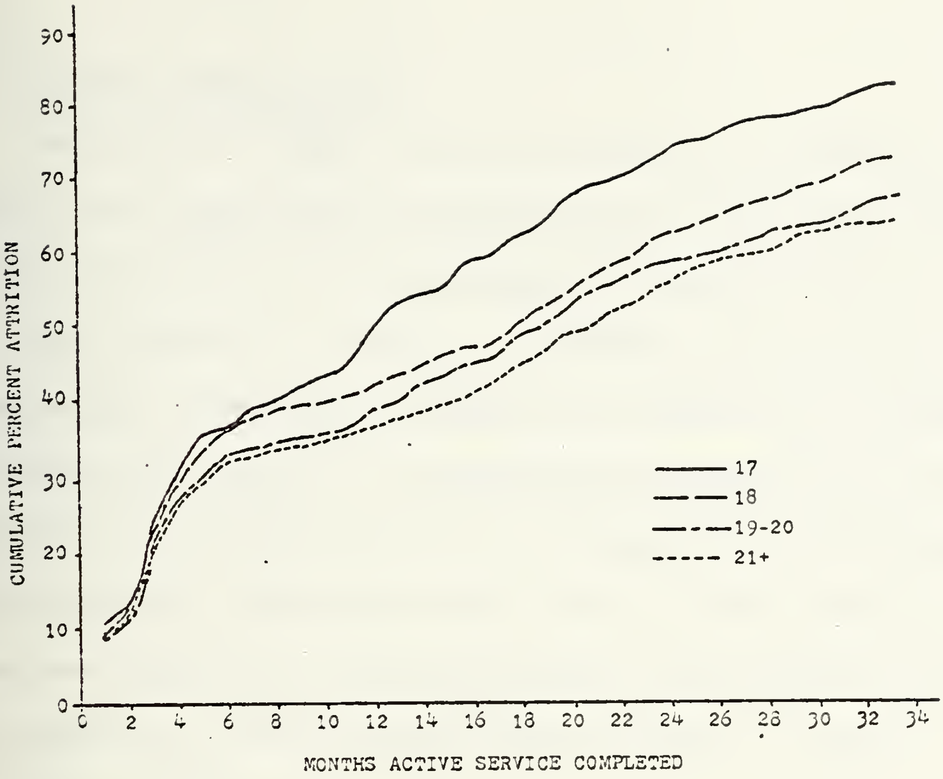
Table 10

Attrition at 34 Months by Demographic Variables for Experimental and Control Groups

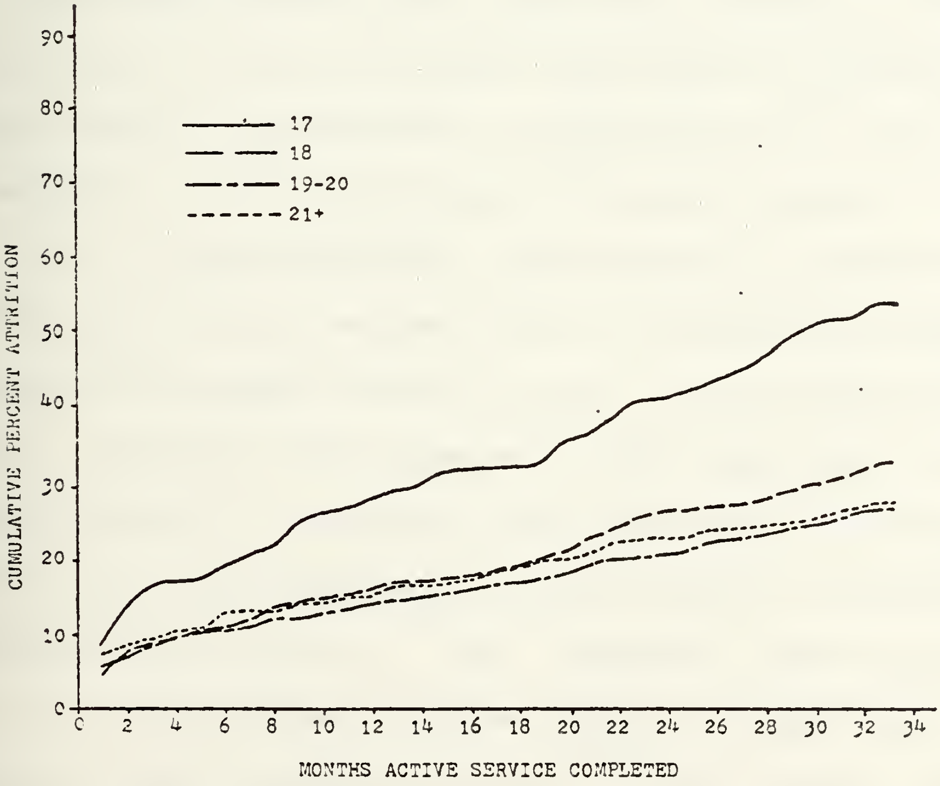
	Experimental (N=2257)		Control (N=2140)		Total (N=4397)	
Variable	N	Percent	N	Percent	N	Percent
Age at Enlistment						
17	171	85.1	83	56.1	254	72.8
18	458	74.8	181	33.8	639	55.7
19-20	666	69.4	283	27.9	949	48.1
21+	320	66.1	128	29.0	448	48.4
Race						
White	1398	73.2	582	31.8	1980	52.9
Nonwhite	217	62.7	93	29.9	310	47.2
Dependents						
None	1524	71.3	622	31.1	2146	51.9
One or More	91	75.8	53	37.9	144	55.4
Years of Formal Education						
≤10	269	83.5	163	61.3	432	73.5
11	317	79.4	135	42.7	452	63.2
12	908	67.3	334	24.0	1242	45.3
>12	121	65.1	43	25.6	164	46.3
Educational Certificate Attained						
None	446	85.1	213	55.5	659	72.6
GED	167	80.7	85	49.4	252	66.5
HSDG	966	65.6	368	23.7	1334	44.1
HS+	36	66.7	9	27.3	45	51.7

Table 10 (Continued)

Variable	Experimental (N=2257)		Control (N=2140)		Total (N=4397)	
	N	Percent	N	Percent	N	Percent
Mental Group						
I	74	69.2	24	20.2	98	43.4
II	542	70.8	228	30.7	770	51.1
III U	525	70.9	216	30.5	741	51.2
III L	436	73.5	195	36.8	631	56.2
IV	36	73.5	11	28.2	47	53.4
Recruit Quality						
Alpha	861	67.0	331	25.4	1192	46.1
Bravo	280	85.6	137	51.3	417	70.2
Charlie	308	68.8	131	28.9	439	48.7
Delta	166	84.3	76	65.0	242	77.1



a. Experimental Group



b. Control Group

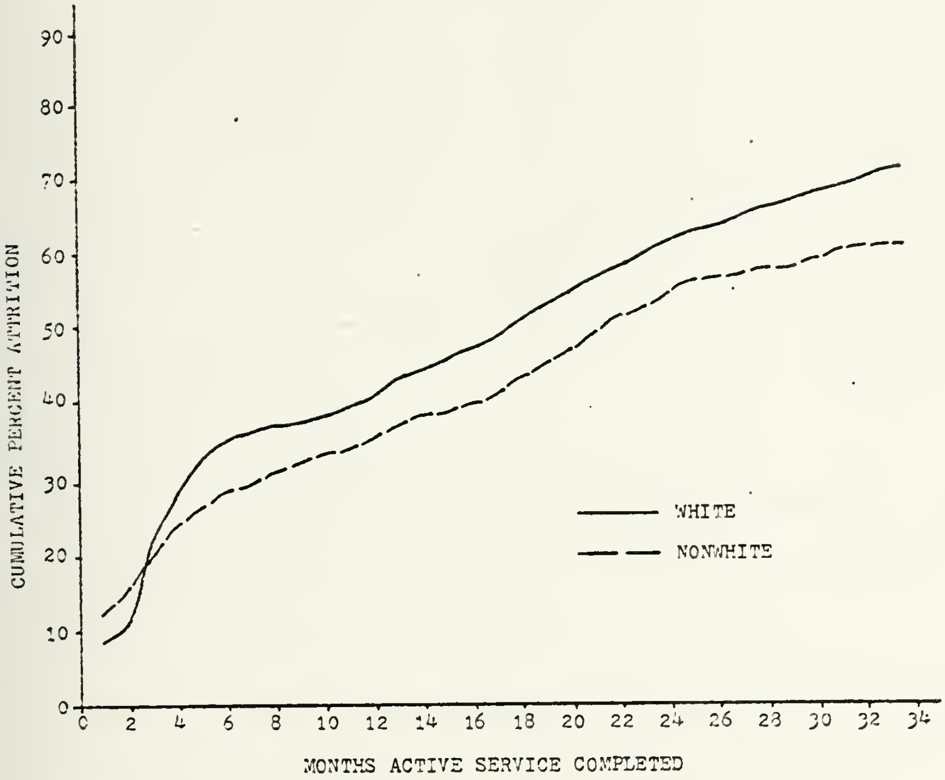
Figure 2. Attrition over time by age at enlistment for experimental and control groups.

Racial Composition

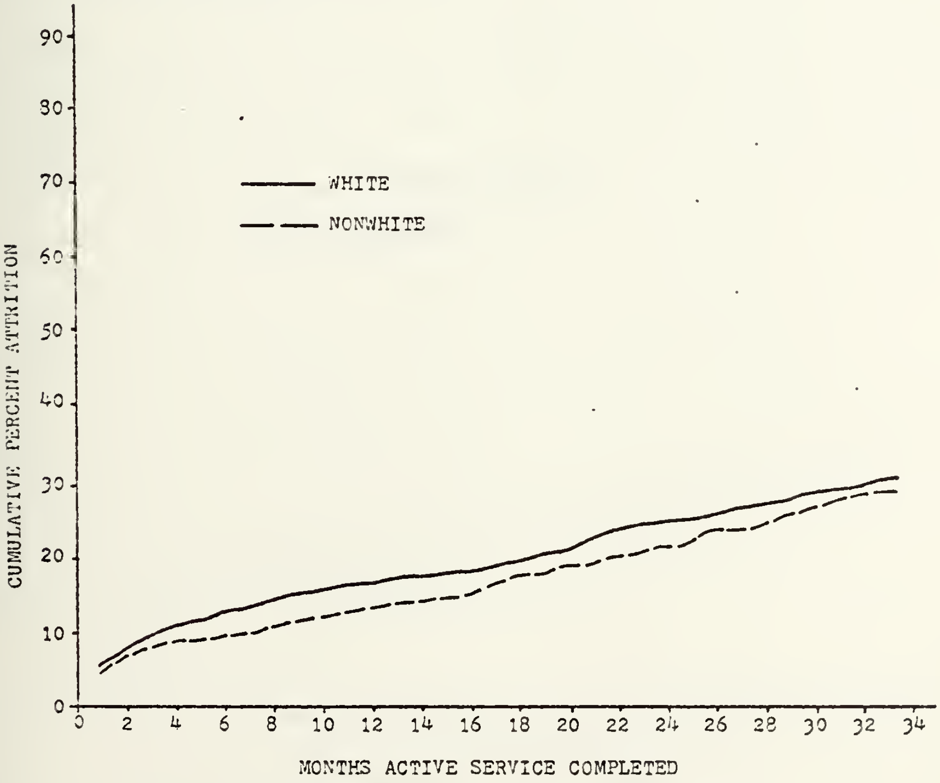
As shown in Table 10, by the end of 34 months of service, whites had experienced significantly higher attrition rates than minorities in the experimental group (73.2 vs. 62.7%; χ^2, 1df, 15.18, $p < .001$). A possible explanation may be that whites used the voluntary out option more readily than did minorities due to a perceived availability of more alternate job opportunities. No significant difference in attrition was associated with race for the control group. The loss rates for the experimental and control groups may be compared in the LOS time plots shown in Figure 3.

Number of Dependents

The control study group confirmed Lockman's [1976] finding that there is a statistically significant relationship between number of dependents (no dependents vs. one or more dependents) and the attrition (12 months) rates ($Z = 2.52$; $p < .05$). Single personnel experienced an attrition rate (12 months) of 15.7 percent while 25 percent of those with dependents attrited (control only). In the experimental group, personnel with dependents still were more likely to attrite (53.3%, 12 months) than their single counterparts (40.8%) but this difference was not found to be statistically different ($Z = 1.86$; $p > .05$). However, there is evidence that this relationship between number of dependents and the attrition rate is not as strong in later months (see Figure 4 and Table 10). At the end of 34 months in the control group,

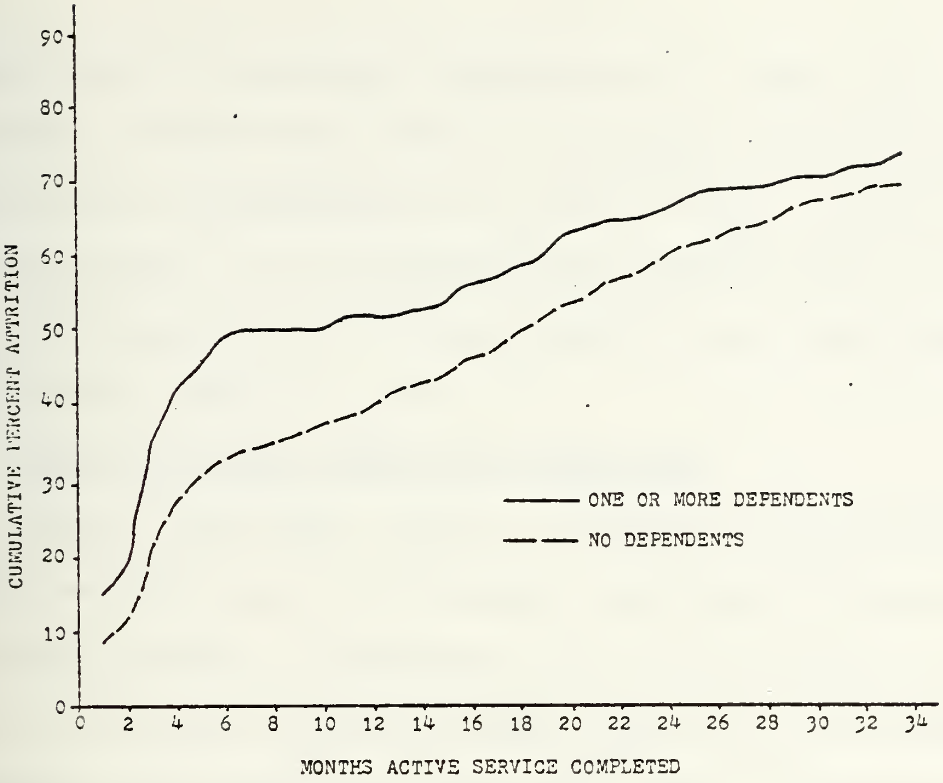


a. Experimental Group

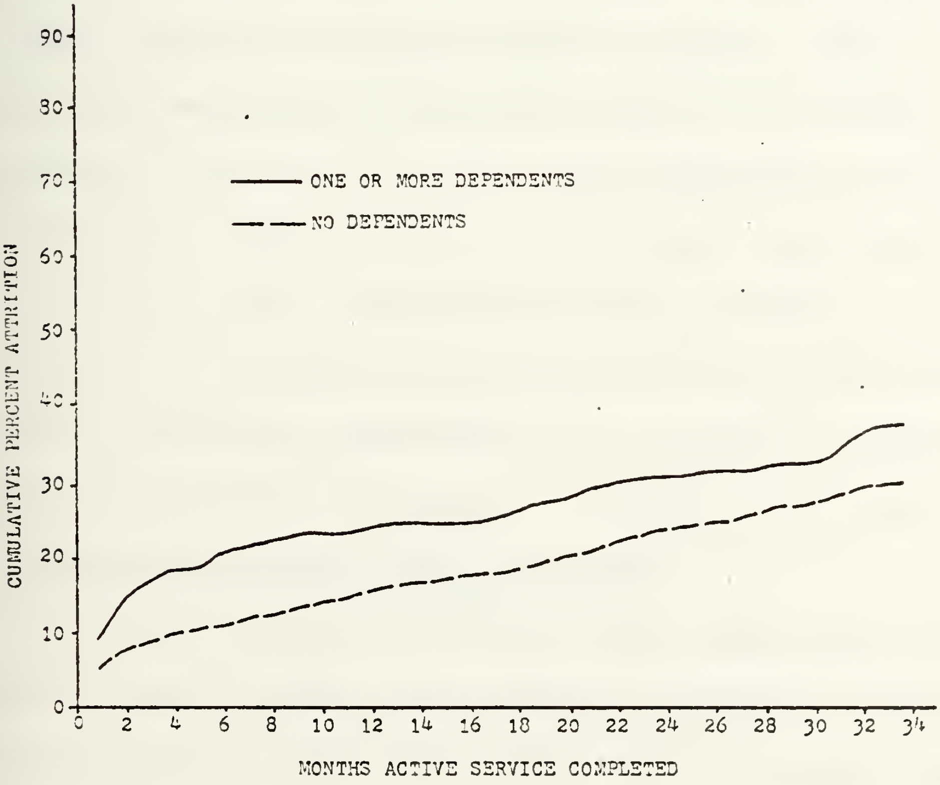


b. Control Group

Figure 3. Attrition over time by race for experimental and control groups



a. Experimental Group



b. Control Group

Figure 4. Attrition over time by number of dependents at enlistment for experimental and control groups

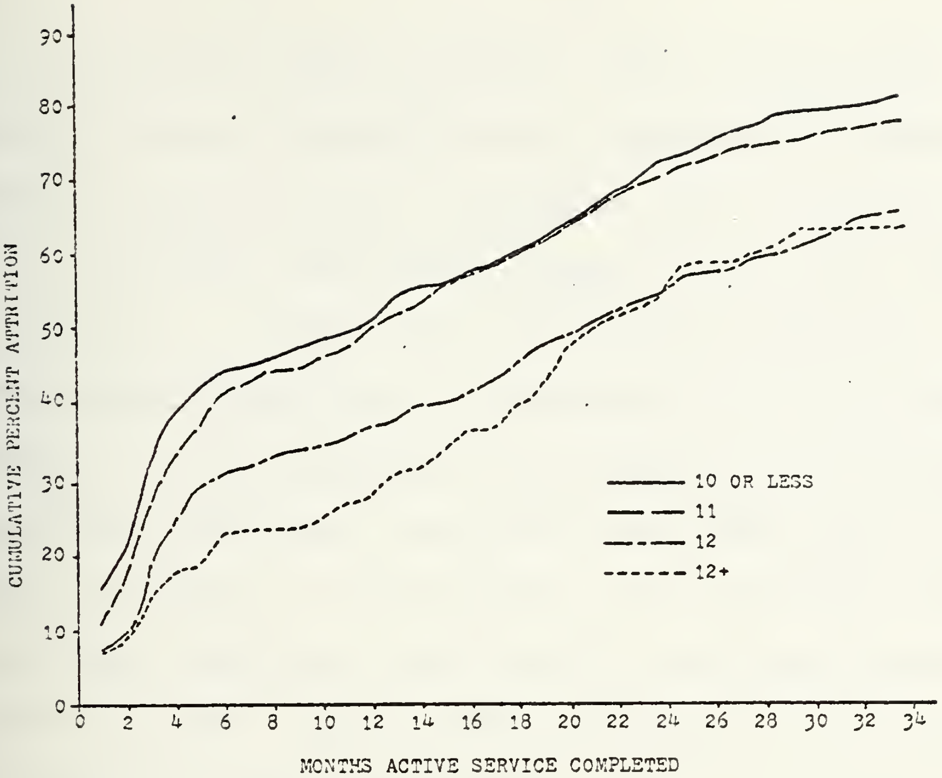
there was no statistical difference (χ^2, 1df, 2.46; $p > .10$) between the attrition rates of personnel with no dependents and those with dependents (31.1 vs. 37.9%). In the experimental group, 71.3 percent of the personnel with no dependents attrited compared to 75.8 percent of those with dependents (χ^2, 1df, 0.928; $p > .30$).

Years of Formal Education Completed

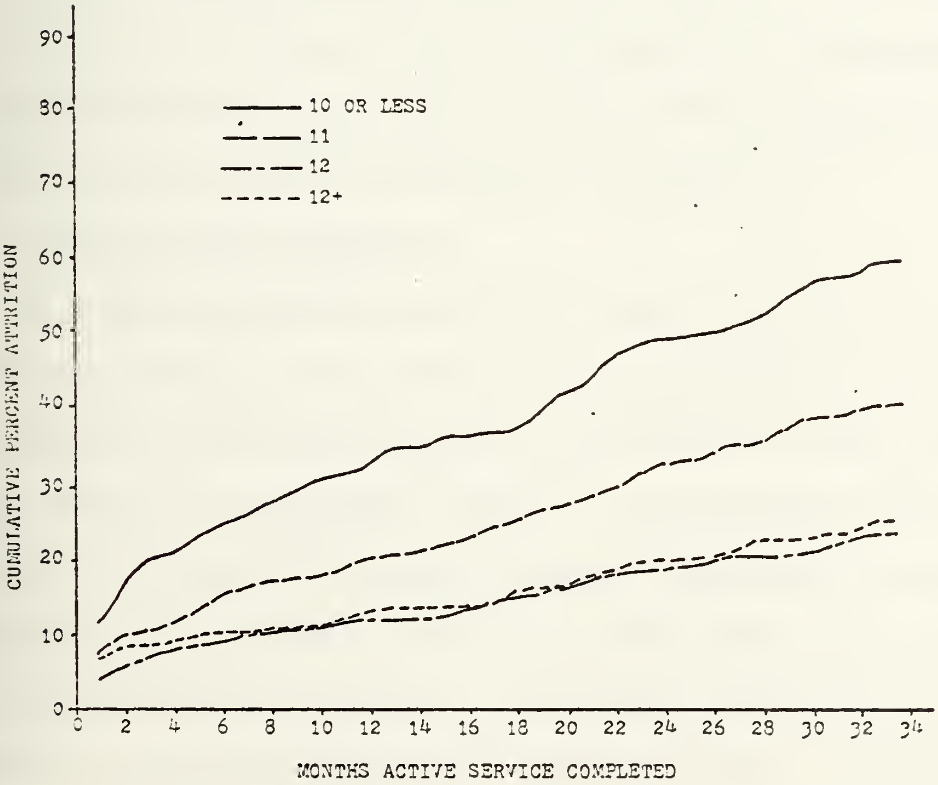
Within both study groups, a negative relationship was found between years of education completed and attrition--the fewer years of education a man had, the more likely he was to attrite (except the loss rates with 12+ years of education were similar to the loss rates of those with 12 years). As shown in Table 10, in both groups those with 10 or fewer years of education had the highest overall attrition rate; and those with 12 years of education or more, generally the lowest (83.5 vs. 65.1% for the experimental group; $Z = 4.73$, $p < .01$; and 61.3 vs 25.6% for the control group; $Z = 7.25$, $p < .01$). Loss rates over 34 months are plotted in Figure 5. In both the experimental and the control group, attrition rates for personnel with 12 years of education and those with more than 12 years of education are quite similar.

Educational Certificate Attained

As shown in Table 10, in both the experimental and control groups, those without a high school diploma or GED had the highest attrition; and those who were high school graduates the lowest attrition rate (85.1 vs. 65.6%, $Z = 7.18$, $p < .01$ for the experimental group; and 55.5 vs. 23.7%, $Z = 12.17$,



a. Experimental Group



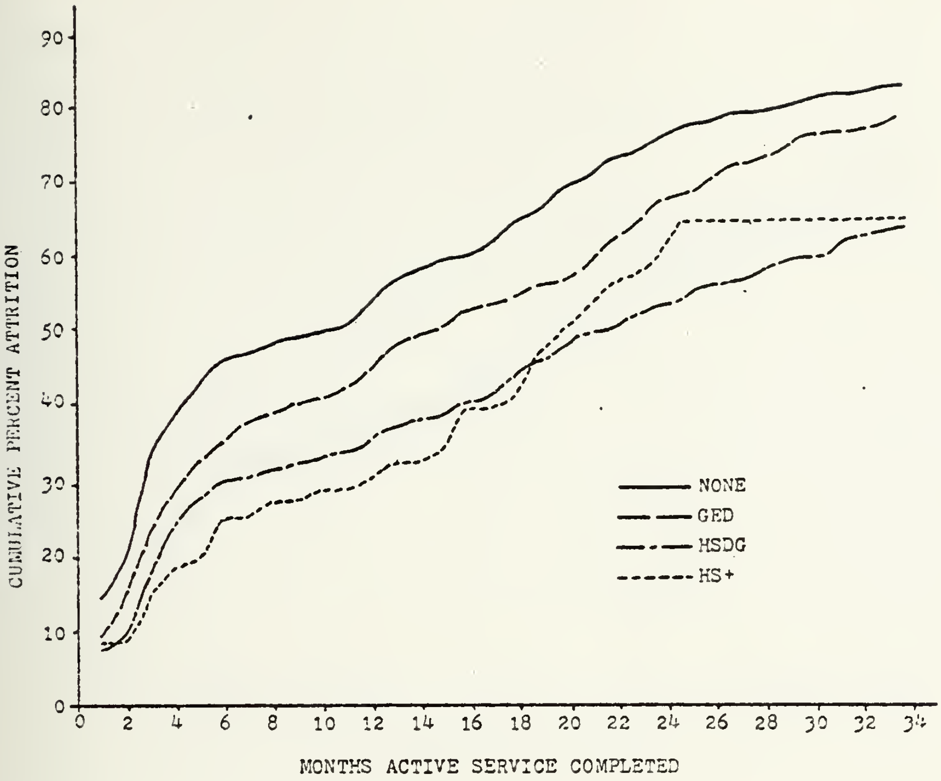
b. Control Group

Figure 5. Attrition over time by years of formal education completed for experimental and control groups

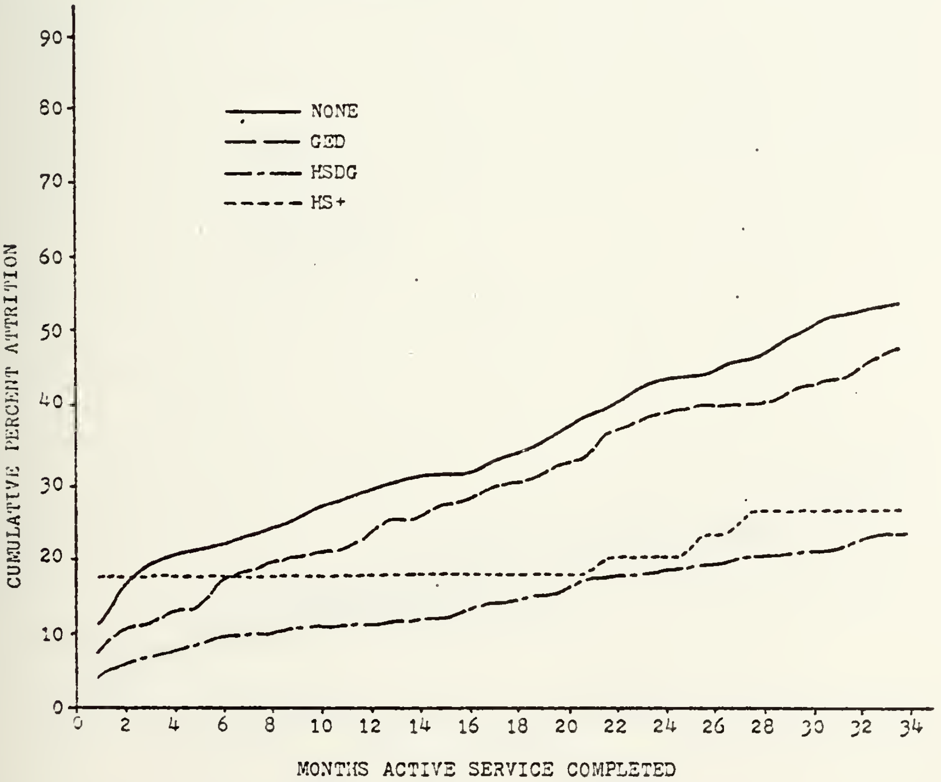
$p < .01$ for the control group). The attrition rate for GED certificate holders was not significantly different from that for non-high school graduates (80.7 vs. 85.1%, $Z = 1.46$, $p > .14$ for the experimental group; and 49.4 vs. 55.5%, $Z = 1.33$, $p > .18$ for the control group subjects). Clearly, a GED holder should not be classified as a high school diploma graduate. Education beyond high school was not found to be associated with lower attrition rates than those of high school graduates. Statistically, the attrition rates for high school graduates and personnel receiving education beyond high school (small numbers of people in both samples, see Table 10) were not different (65.6 vs. 66.7%, $Z = 0.17$, $p > .87$ for experimental personnel; and 23.7 vs. 27.3%, $Z = 0.48$, $p > .63$ for the control group). Cumulative attrition percentages over time for the different educational certificate groups are plotted in Figure 6.

Mental Group Category

Significant differences (χ^2, 4df, 14.68, $p < .01$) in attrition among some of the mental categories at 34 months of service were found only for the control group subjects (see Table 10 and Figure 7 data). The highest attrition rates in the control group occurred among men in mental groups II, III U, and III L; and the lowest rates occurred in mental groups I and IV. The largest difference in the attrition rates were between mental groups I (20.2%) and III L (36.8%, $Z = 3.46$, $p < .01$). There were no significant

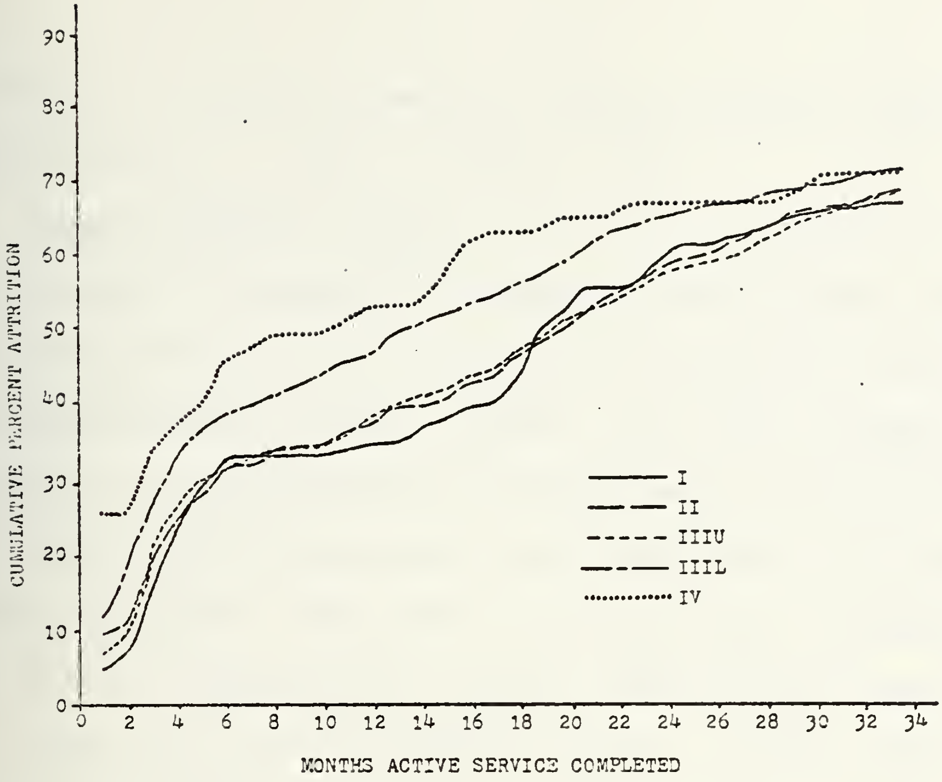


a. Experimental Group

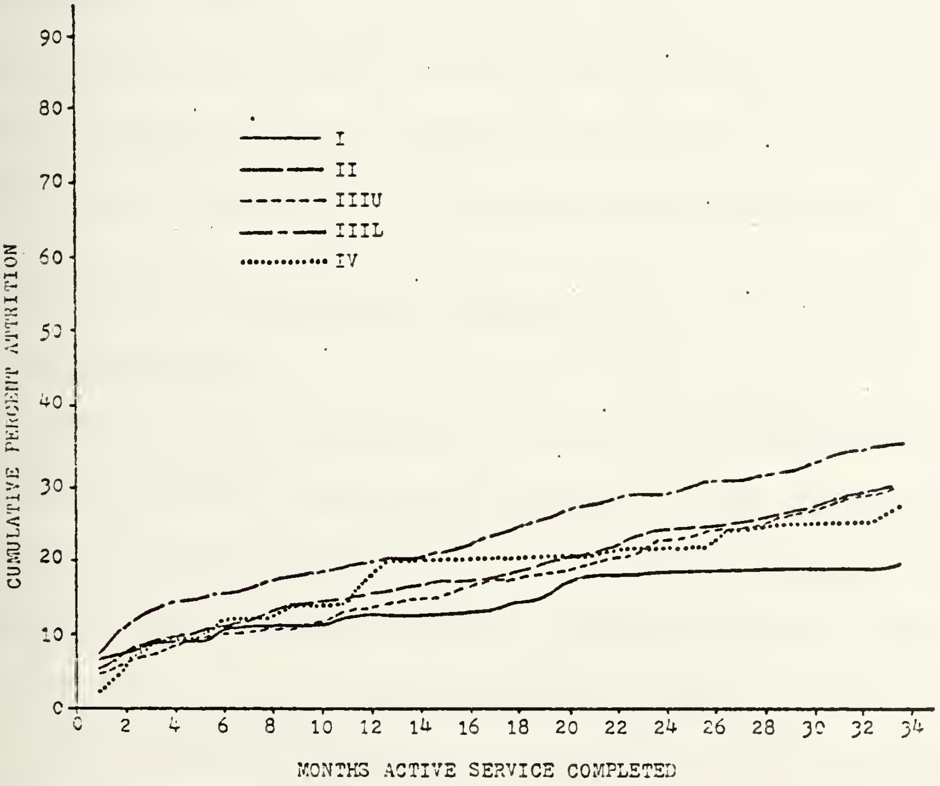


b. Control Group

Figure 6. Attrition over time by educational certificate attained for experimental and control groups



a. Experimental Group



b. Control Group

Figure 7. Attrition over time by mental group category for experimental and control groups

differences among the mental category groups in the experimental group (χ^2, 4df, 1.84; $p > .7$).

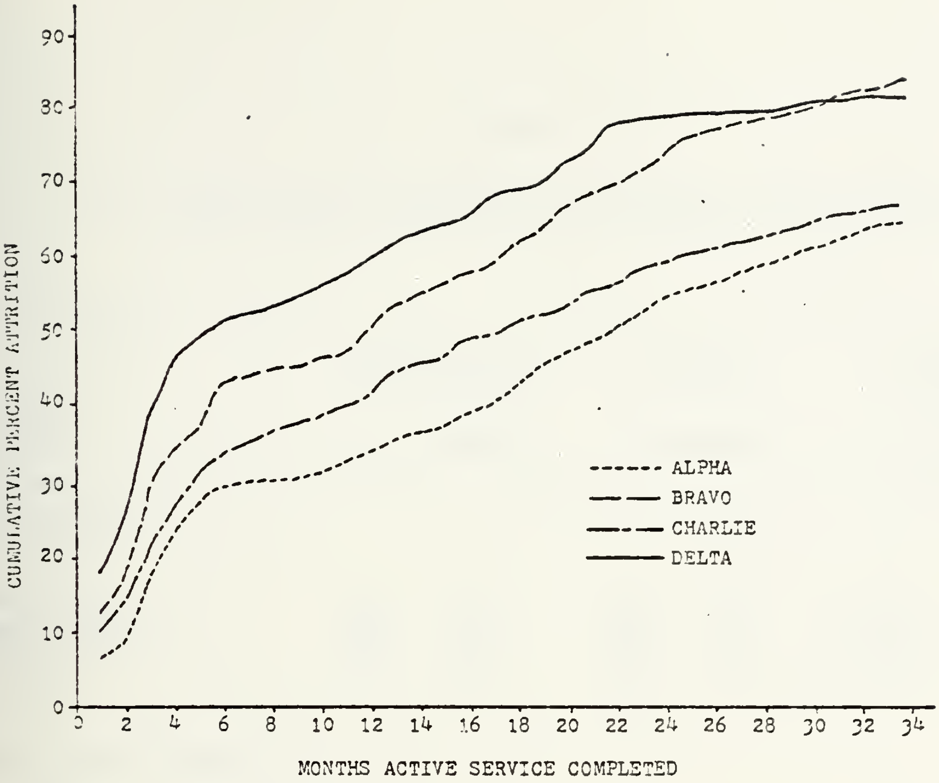
Recruit Quality Index

As shown in Table 10 significant differences associated with the Recruit Quality Index were observed in the control and experimental groups. Within both study groups, the highest attrition rates were found among personnel classified as BRAVO, school qualified, non-high school graduates, and DELTA, nonschool qualified, non-high school graduates (85.6 and 84.3%, respectively, for the experimental group; and 51.3 and 65.0% for the control group). ALPHA, school qualified, high school graduate, and CHARLIE, nonschool qualified, high school graduate, personnel attrition rates closely paralleled each other in both study groups as shown by the plots in Figure 8. It appears clear from Figure 8 that BRAVOs and DELTAs are, on average, poor attrition risks.

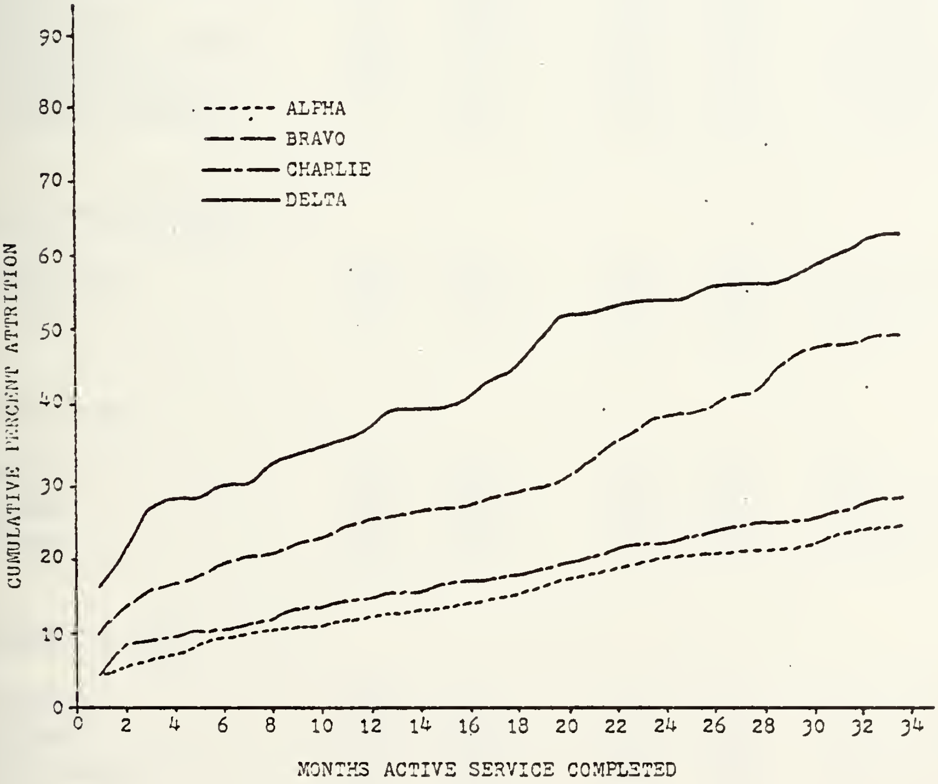
Attrition by Situational Variables

RTC Attended

Significant differences in attrition rates were observed among the Recruit Training Commands in the experimental group, as shown in Table 11. Experimental group personnel trained at RTC Orlando had the lower attrition rate (65.3%) at 34 months of service compared to rates of 72% ($Z = 2.57$, $p < .05$) and 73% for RTC San Diego and RTC Great Lakes, respectively. However, the initial difference in attrition rates between experimental group personnel trained at RTC Great



a. Experimental Group



b. Control Group

Figure 8. Attrition over time by recruit quality index for experimental and control groups

Table 11

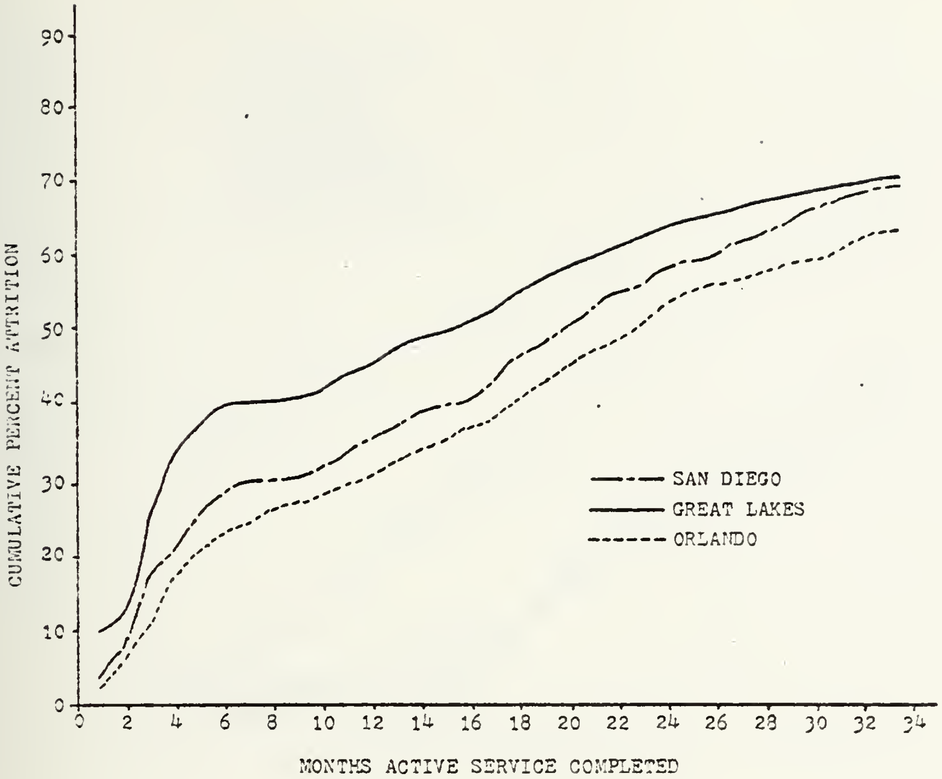
Attrition at 34 Months by Situational Variables for Experimental and Control Groups

	Experimental		Control		Total	
Variable	N	Percent	N	Percent	N	Percent
RTC Attended						
San Diego	433	72.0	189	33.0	622	53.0
Great Lakes	642	73.0	264	31.4	902	52.6
Orlando	440	65.3	216	30.6	656	47.6
Initial Fleet Assignment						
Air Squadron	42	39.6	13	9.5	55	22.6
Ship	377	66.4	138	21.0	515	42.1
Submarine	51	50.5	27	18.5	78	31.6
Aircraft Carrier	126	70.0	35	19.9	161	45.2
Shore Duty	478	74.3	234	37.7	712	56.4
"Other" Sea-Duty	71	45.8	24	14.4	95	29.5
Rate Classification						
Nongendet	550	53.6	212	15.2	762	31.5
Gendet	1065	86.6	463	61.8	1528	77.2
GENDET Rates						
Seamen	723	88.3	326	69.8	1049	81.6
Firemen	207	85.9	74	46.5	281	70.3
Airmen	135	79.4	63	51.2	198	67.6
NONGENDET Rates						
Ops/Weps	129	51.4	60	14.6	189	28.5
Support	83	66.9	31	20.8	114	41.8
Engineering	166	61.0	61	16.9	227	35.9
Aviation	107	40.4	40	12.0	147	24.6

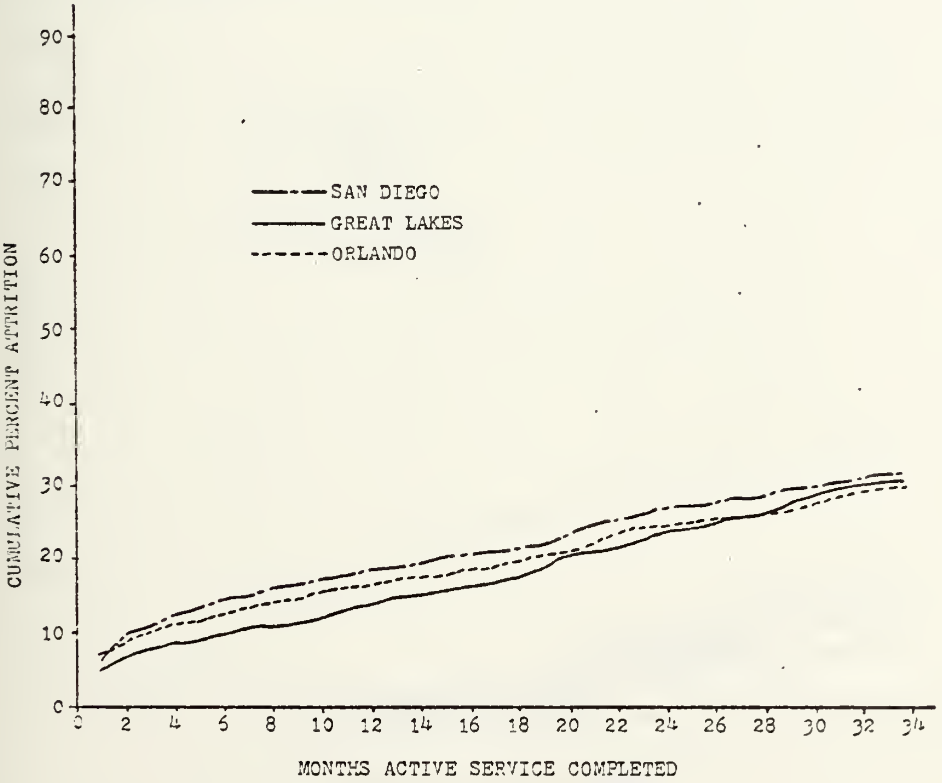
Lakes and those trained at RTC San Diego was much more pronounced during the first 12 mont (46.4% and 36.3%, respectively, Z = 3.02, $p < .01$) than at 34 months of service (73% and 72%, respectively, Z = 1.40; $p > .16$). After the six month service (see Figure 9) RTC Great Lakes' cumulative attrition rate began to converge with RTC San Diego's, until there was only a 1 percent difference in attrition at the 34 month LOS (Table 11). In the control sample there were no significant differences in attrition among RTC San Diego (33%), RTC Great Lakes (31.4%) and RTC Orlando (30.6%). Figure 9 shows the graphs of the data.

Initial Fleet Assignment

The data in Table 11 associated with the initial fleet assignment variable reflect only attrition subsequent to the initial assignment. As shown, 34 months after enlistment, those personnel who were assigned to shore stations had the highest attrition rates in both groups (74.3% for the experimental group, and 37.7% for the control group). Similar to the findings of Guthrie et al., [1978], in both groups, those personnel assigned to air squadrons had the lowest attrition rates (experimental, 39.6%; and control, 9.5%). Cumulative attrition plots (Figure 10) show similar rank ordering of attrition rates by first assignment, from shore-duty to air squadrons, for both groups. Initial assignment to shore-duty stations appears to increase the risk of attrition. This is particularly evident for control group personnel as shown in

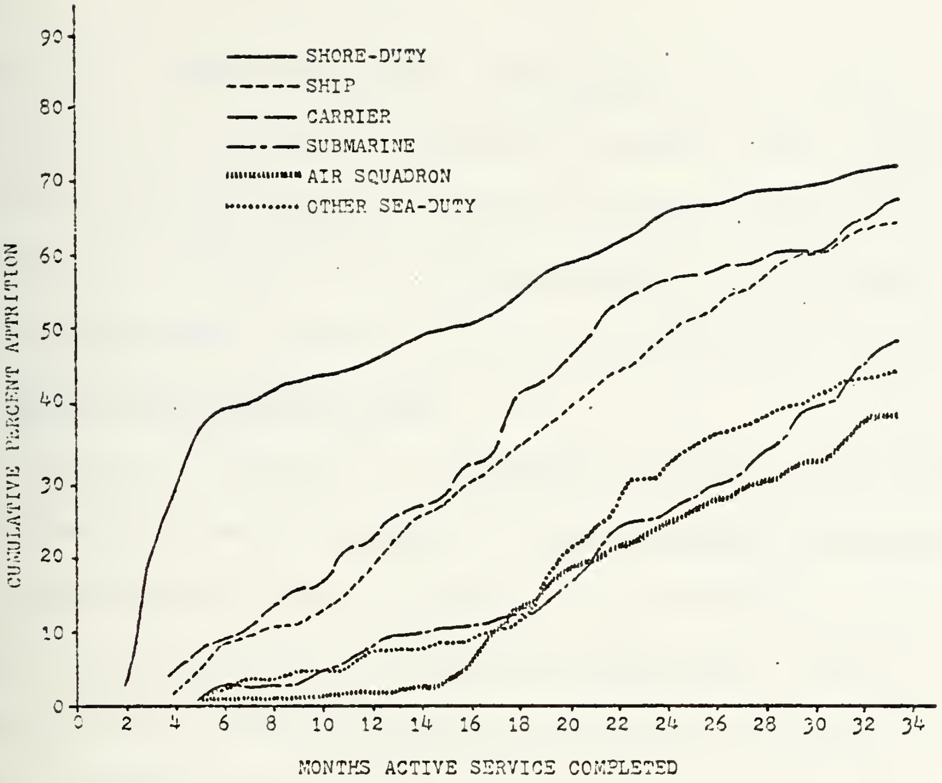


a. Experimental Group

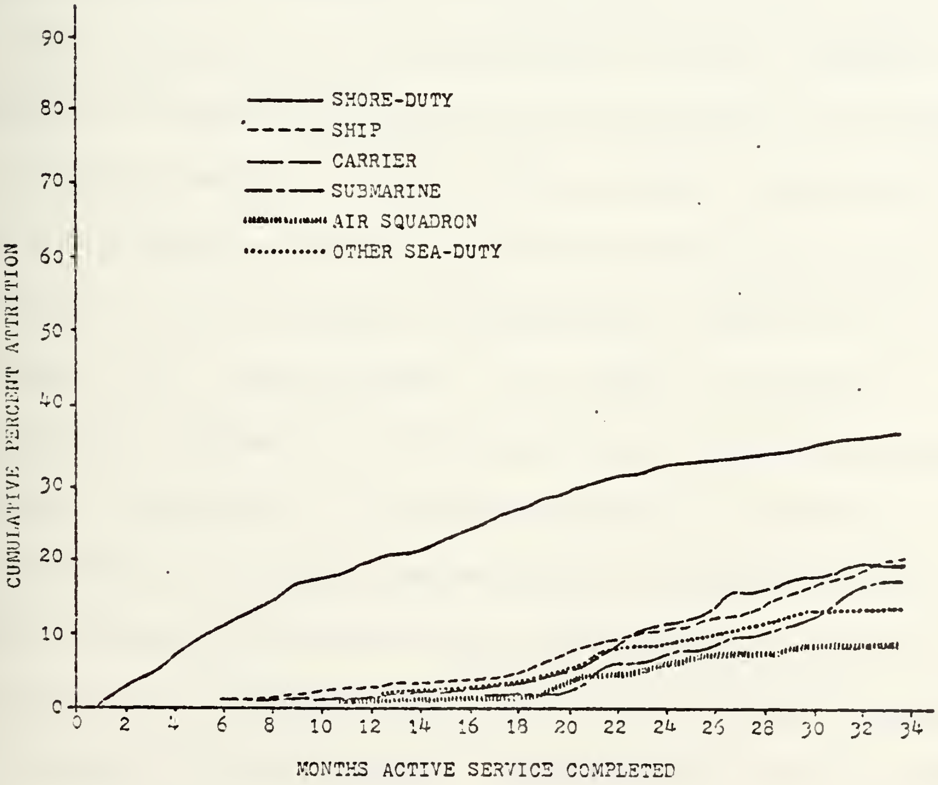


b. Control Group

Figure 9. Attrition over time by recruit training center attended for experimental and control groups



a. Experimental Group



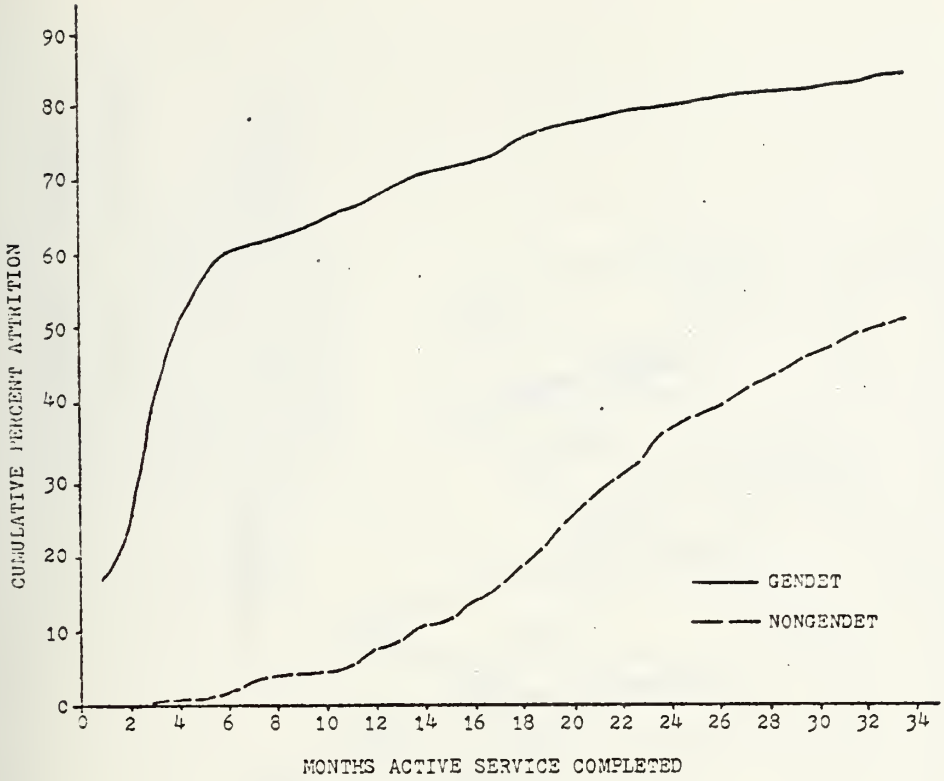
b. Control Group

Figure 10. Attrition over time by initial Fleet duty assignment for experimental and control groups

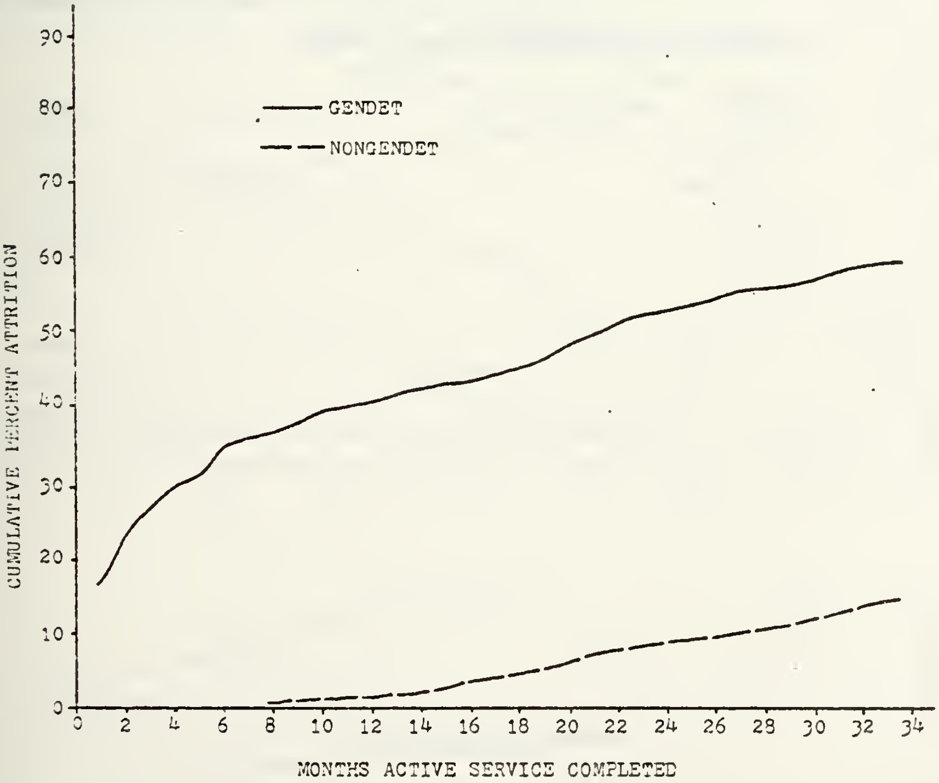
Figure 10b where shore-duty assignees are so clearly different from all "others." Even the initial duty assignment with the second highest attrition rate at 34 months (ship duty) had a significantly lower attrition rate than did shore assignment (21% vs. 37.7%; $Z = 6.56$; $p < .01$).

GENDET/NONGENDET Rates

As shown in Table 11, GENDETS in both study groups attrited much more frequently than NONGENDET personnel. In the experimental group, 86.6% of the GENDETS attrited in 34 months compared to 53.6% of the NONGENDETS, while in the control group the difference is much more dramatic with 61.8% of the GENDETS attrited compared to only 15.2% of the NONGENDETS attrited. Length of service attrition plots (Figure 11) show that attrition differences between GENDETS and NONGENDETS are established early and maintained throughout the 34 month period in both study groups. Because of these marked differences in the cumulative attrition percentages an estimate of the conditonal probability function, as described for Figure 1b, was provided. As shown in Figure 12, the significant increase in the proportion attriting after recruit training, reflected in the third month of Figure 1b, can now be attributed to GENDET experimental group personnel. The GENDET personnel were the only experimental subjects to exercise to any significant degree their VOLOUT option immediately upon receipt of the option. Interestingly, only experimental and control GENDET personnel attrited during the first month



a. Experimental Group



b. Control Group

Figure 11. Attrition over time by GENDET/NONGENDET rate classification for experimental and control groups

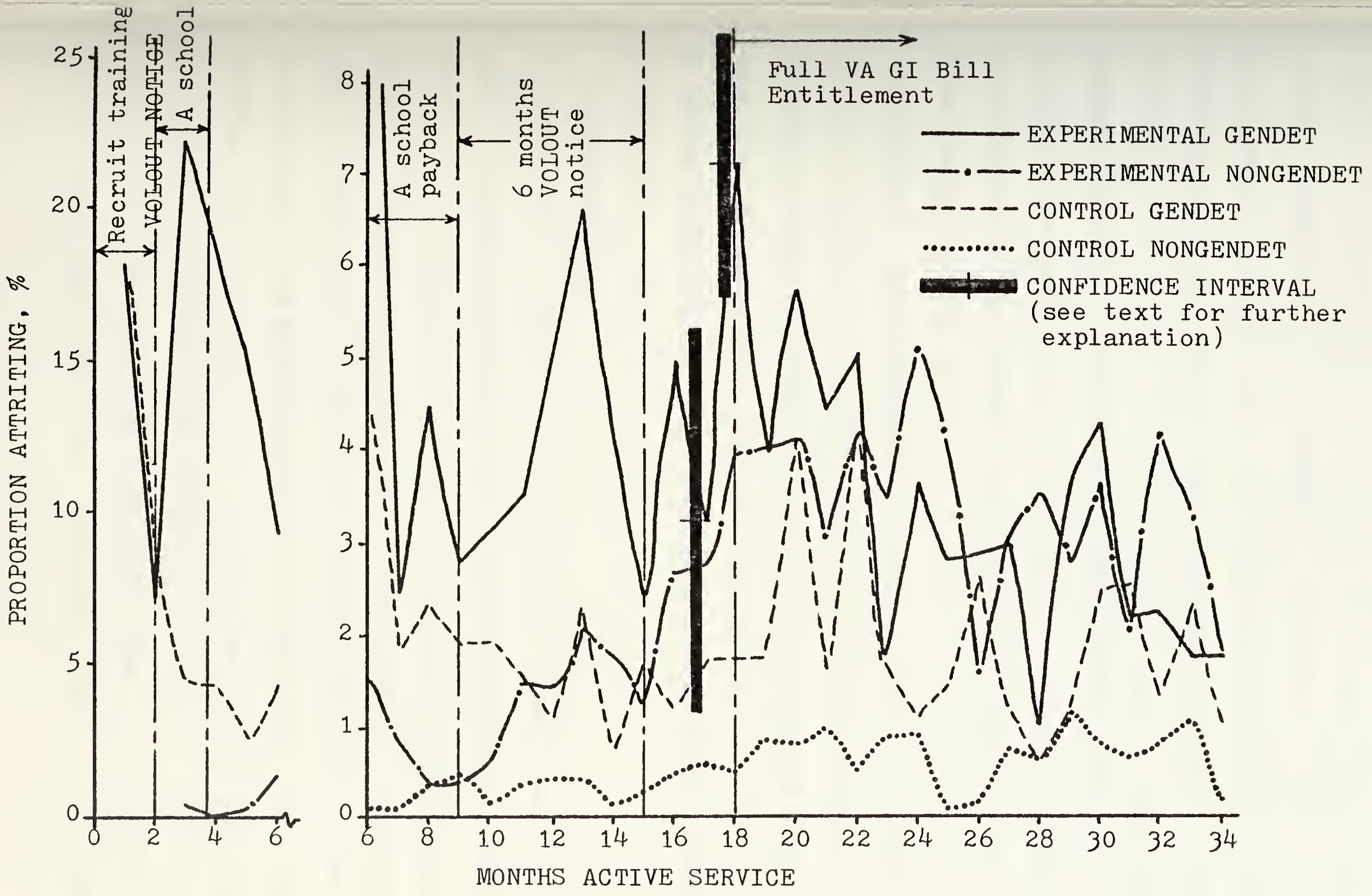


Figure 12. Conditional probability of attrition over time by GENDET/NONGENDET personnel for experimental and control groups

while undergoing recruit training. The proportions attriting of the NONGENDET, i.e., A school, personnel were not even large enough to plot until the third and sixth month for experimental and control groups. The scale change on the vertical axis should be noted, because despite the seemingly marked variation in rate due to the "peaked" appearance of the curve, only the 17 to 18 month transition represented a statistically significant change in the loss rate for experimental GENDET personnel (at the .05 level). Elsewhere, the standard error confidence intervals (plus or minus two standard errors) overlapped between successive q_i's, and inferences must be guarded. But at least for the GENDET experimental personnel, full GI Bill educational benefits at the eighteen month might have had a significant influence on attrition behavior.

GENDET Rates

As shown in Table 11, personnel who entered as Seamen had the highest attrition rates (after 34 months) in both experimental and control groups (88.3% and 69.8% respectively). While the Seamen attrition rate of 88.3 percent in the experimental group was significantly different from the Airmen attrition of 79.4 percent at the .01 level ($Z = 3.12$), the Firemen attrition rate of 85.9 percent was not significantly different from that of the Seamen ($Z = .10$, $p > .32$) or the Airmen ($Z = 1.74$, $p > .08$) attrition rates. The similarity of the experimental attrition rates was borne out by the

converging plots shown in Figure 13a. As might be suspected from Figure 13b, however, the attrition rate of control group members entering as Seamen was significantly different from that of both Firemen and Airmen (69.8 vs. 46.5%, $Z = 5.28$, $p < .01$; and 69.8 vs. 51.2%, $Z = 3.88$, $p < .01$, respectively). Again, there was no significant difference between the Firemen and Airmen attrition rates (46.5 vs. 51.2%, $Z = 0.78$, $p > .44$) in the control group after 34 months.

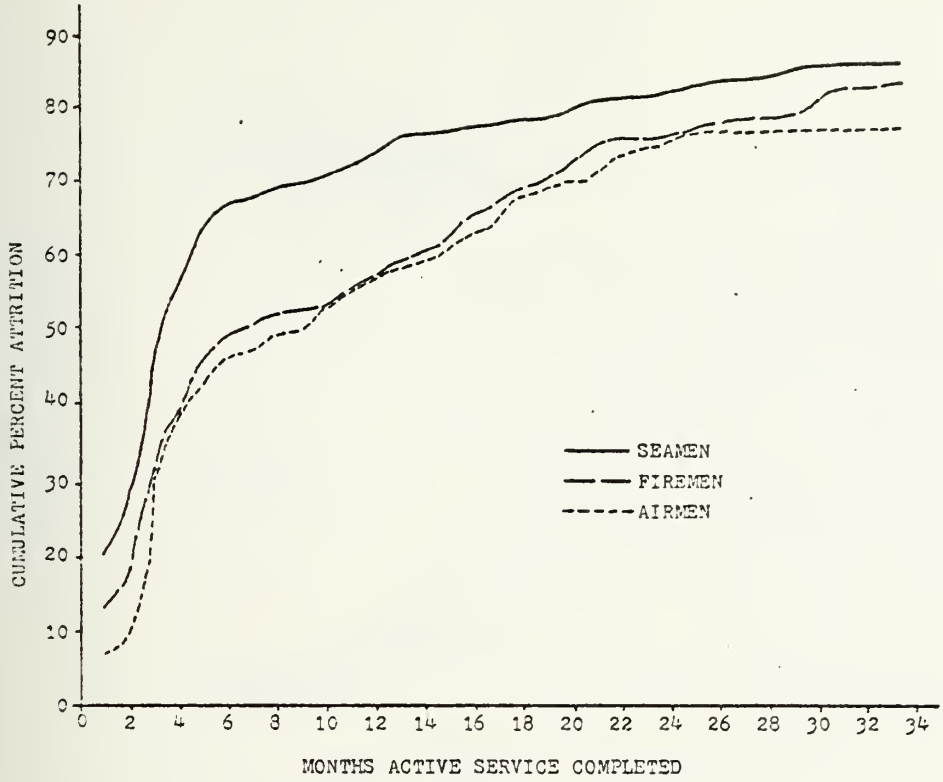
NONGENDET Rates

As shown in Table 11 in both the experimental and the control gropus 34 months after enlistment, personnel in the support ratings had the highest attrition rate and those who entered in aviation ratings the lowest (66.9% vs. 40.4%, $Z = 4.87$, $p < .01$, in the experimental group; and 20.8 vs. 12.0%, $Z = 2.52$, $p < .05$ in the control group). There were significant attrition differences associated with rating category in both study groups, and the plots in Figure 14 exhibit the same rank ordering of attrition rates with support ratings consistently having the highest attrition rate, followed by engineering, operations/weapons, and aviation ratings. The specific rate codes that were assigned to each of the four categories can be found in Table 12.

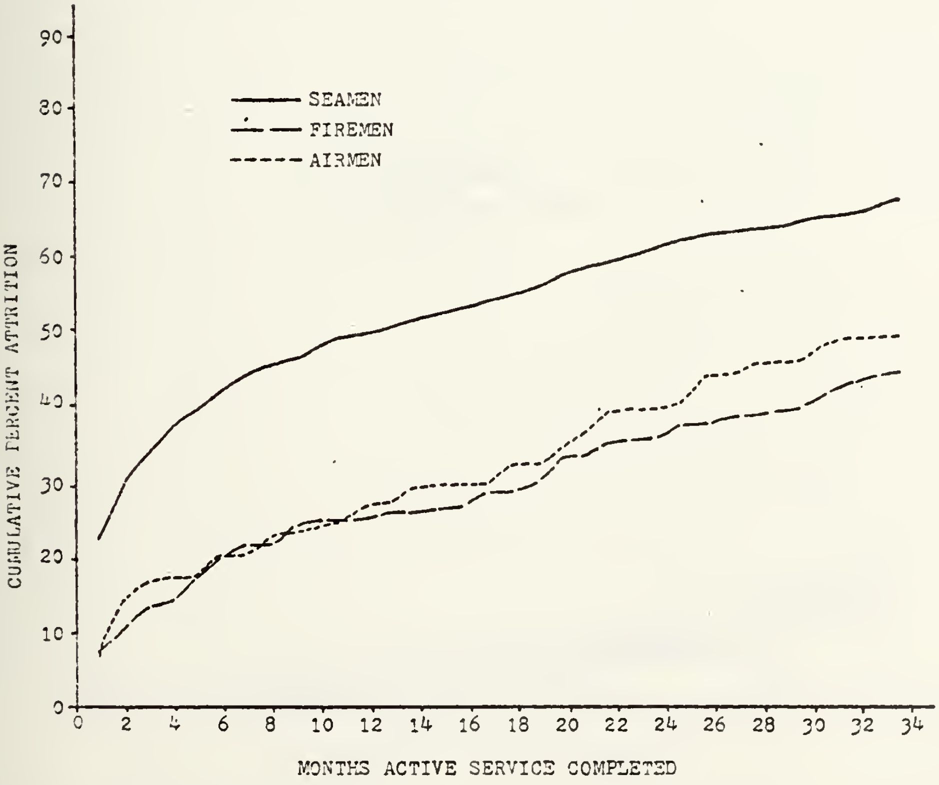
GENDET/NONGENDET Attrition for Control Group Personnel

Recruit Quality Index

Table 13 clearly shows for the control group that, Charlie personnel have the lowest attrition rates among the

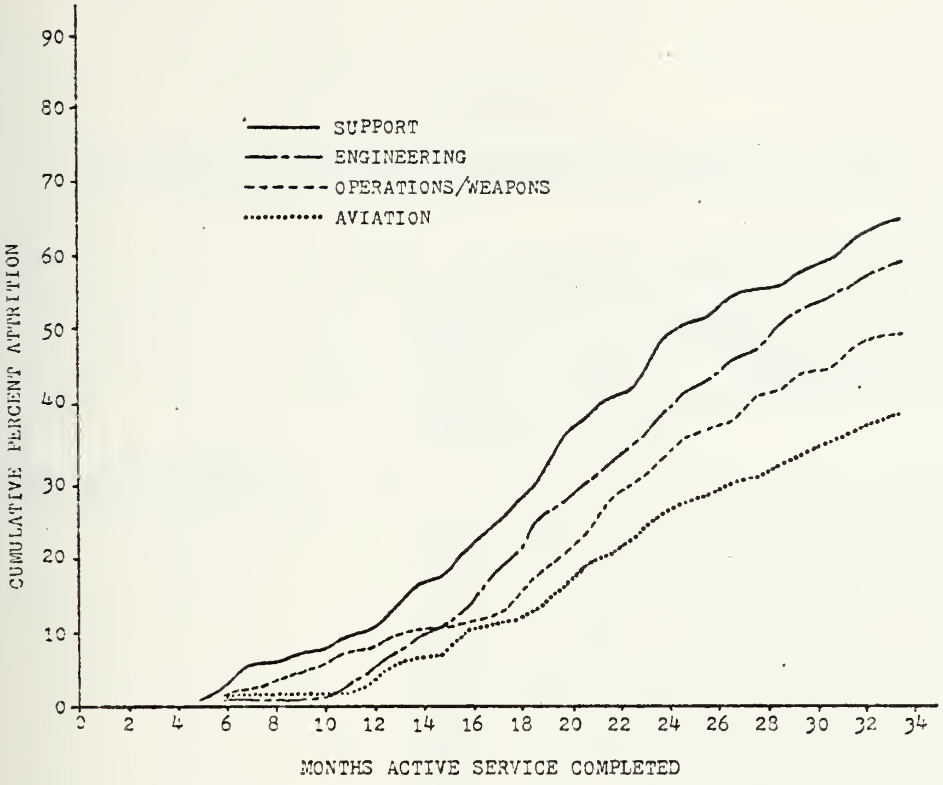


a. Experimental Group

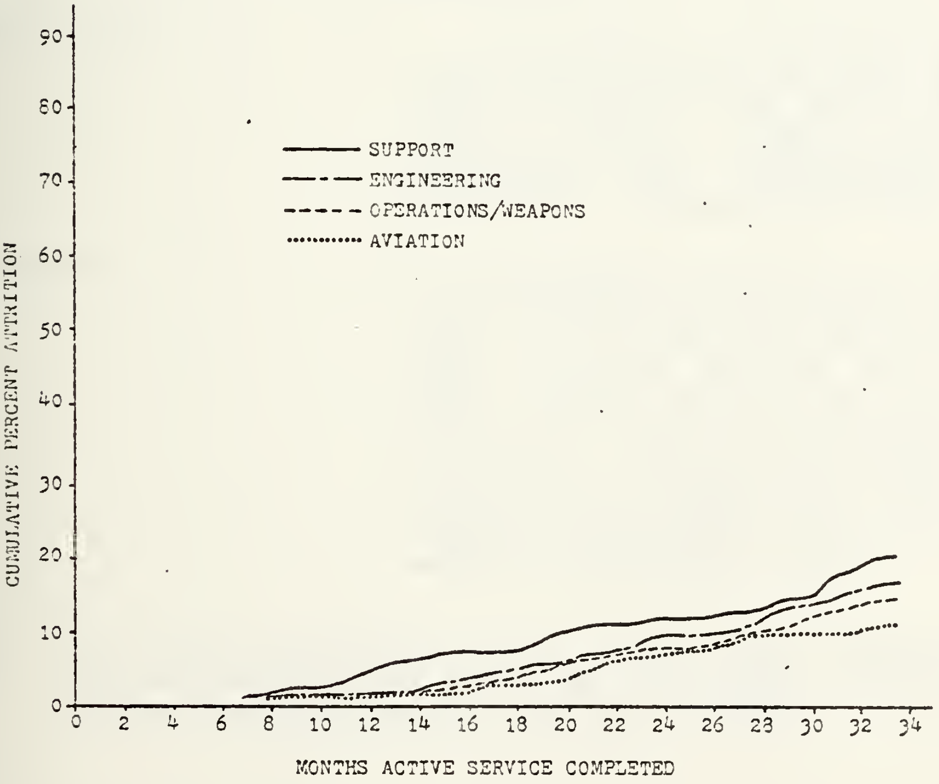


b. Control Group

Figure 13. Attrition over time by GENDET rates for experimental and control groups



a. Experimental Group



b. Control Group

Figure 14. Attrition over time by NONGENDET rate categories for experimental and control groups

Table 12

Definition of NONGENDET (A school) Rates

Support = Support rates YN, LN, PN, DP, SK, DK, MS, IS, SH, JO, PC, LI, DM and MV. (MAPMIS rate codes 1700 to 3300). Examples include yeomen (YN), journalists (JO) and musicians (MU).

Operations/Weapons = Personnel in operational rates and rates involving weapons systems which include the rates of BM, MA, QM, SM, OS, EW, ST, STG, STS, OT, TM, GM, GMM, GMT, GMG, FT, FTG, FTM, FTB, MT, MN, ET, ETN, ETR, DS, PI, IM, OM NC, RM, CTT, CTA, CTM, CTO, CTR, and CII (rate codes 0100 to 1666). Examples include boatswains mates (BM), electronic warfare techs (EW), and cryptologic tech maintenance personnel.

Engineering = Personnel in engineering rates which include MM, EN, MR, BT, BR, EM, IC, HT, PM, and ML (rate codes 3700 to 4700). Examples include enginemen (EM). boilermakers (BM), and boiler technicians (BT).

Aviation = Personnel in aviation rates which include AF, AV, AD, ADR, ADJ, AT, AX, AW, AO, AQ, AC, AB, ABE, ABF, ABH, AE, AM, AMS, AMH, AME, PR, AG, TD, AK, AZ, AS, ASE, ASH, ASM, and PH (rate codes 6080 to 7600). Examples include aviation electronics technicians (AT), air traffic controllers (AC), and aircrew survival personnel (PR).

Note: For the interested reader, rate codes and rate definitions may be found in the MAPMIS Systems Documentation Manual, NAVPERS 15, 642.

Table 13

Attrition at 34 Months by GENDET/NONGENDET for Control Group Personnel by Recruit Quality Index and Race

Variable	GENDET (N = 749) N	GENDET (N = 749) %	NONGENDET (N = 1391) N	NONGENDET (N = 1391) %	TOTAL (N = 2140) N	TOTAL (N = 2140) %
Recruit Quality Index						
Alpha	196	61.3	135	13.7	331	25.4
Bravo	97	70.8	40	30.8	137	51.3
Charlie	99	49.7	32	12.5	131	28.9
Delta	71	76.3	5	20.8	76	65.0
Race						
White	398	63.3	184	15.3	582	31.8
Nonwhite	65	54.2	28	14.7	93	29.9

GENDET rates (49.7%). Alpha personnel have the second lowest attrition rate (61.3%). Bravos and Deltas experience the highest attrition rates in the GENDET category with respective attrition rates of 70.8% and 76.3%. The attrition rates between Alphas and Charlies are statistically different in the GENDET group ($Z = 2.59$; $p < .01$), while in the NONGENDET group, although Charlie personnel have a more favorable attrition rate than Alphas in absolute terms, the difference was not statistically significant (12.5 vs. 13.7%; $Z = .50$, $p > .30$). NONGENDET Bravos and Deltas have a much lower attrition rate

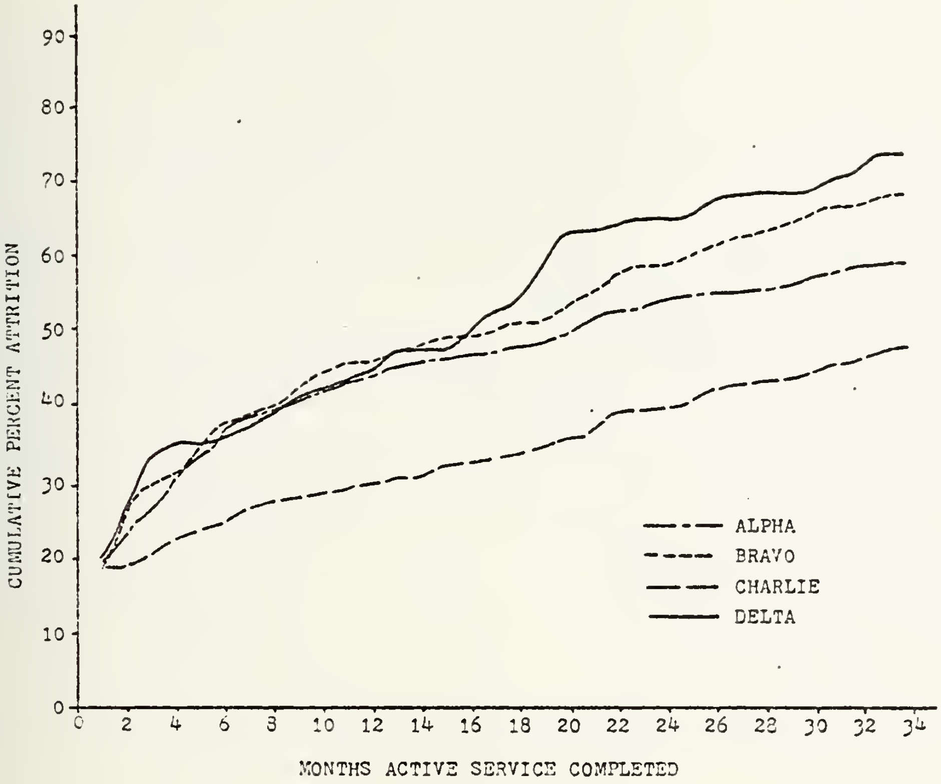
than their GENDET counterparts, but still have attrition rates much higher than those of either the Alphas or Charlies (30.8% and 20.8%). Attrition over time for GENDETS remained fairly consistent over the 34 month period (Figure 15a). However, for NONGENDETS, Bravo personnel had a fairly low attrition rate until after the 20th month. After 20 months, Bravos experienced significantly higher attrition rates than the Alphas (30.8% vs. 13.7%, $Z = 5.04$, $p < .01$).

Racial Composition

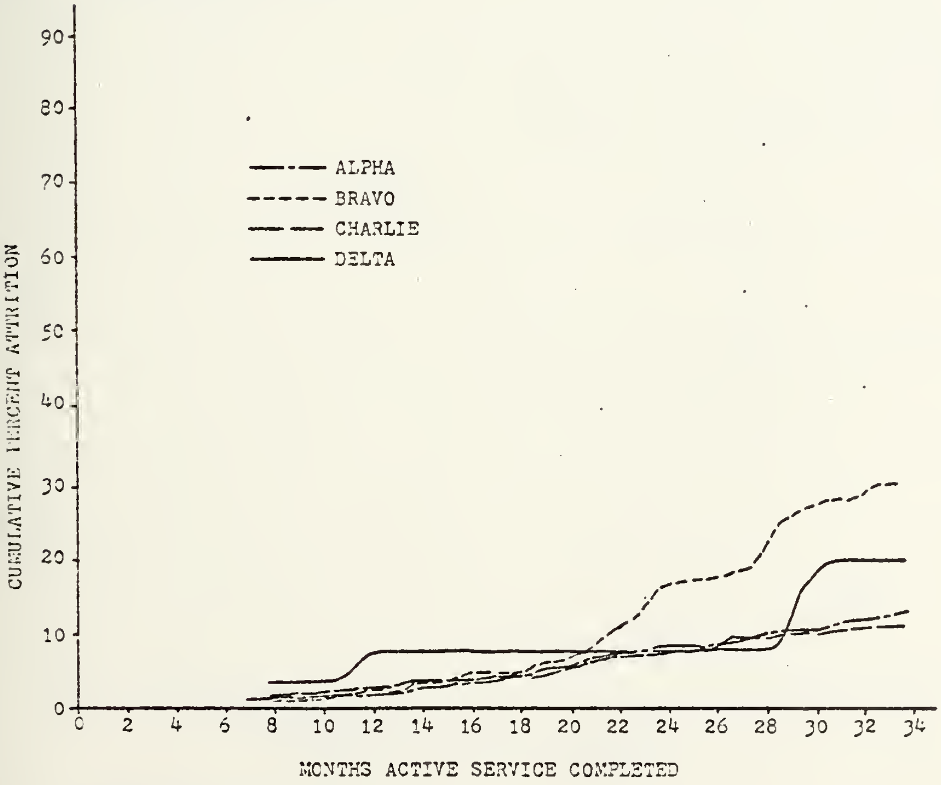
As shown in Table 13, control group whites and nonwhites in the NONGENDET categories had basically the same attrition rates (15.3% vs. 14.7%). However, whites seemed much more dissatisfied (if attrition indicates dissatisfaction) with GENDET assignments than their nonwhite counterparts (63.3% vs. 54.2% attrition). GENDET whites had higher attrition rates than nonwhites over the entire 34 month period (Figure 16a). NONGENDET whites and nonwhites had basically the same attrition rates from the beginning of the study to the end of the 34 month period (Figure 16b).

Correlational Analyses of Attrition

This section deals with product-moment correlations of variables listed in Table 14 for experimental and control samples, and for the two samples as a whole. Tables 15, 16, and 17 give correlations for the three groups. Correlations are useful in determining variables which are candidates for the multiple regression analyses (the dependent variable

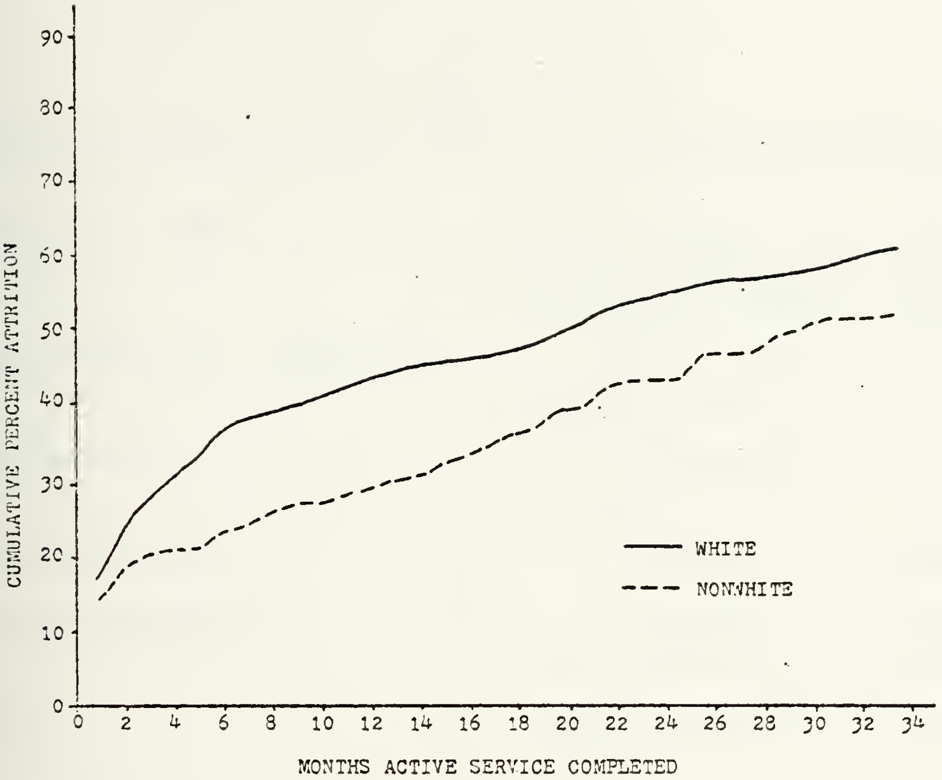


a. GENDET Personnel

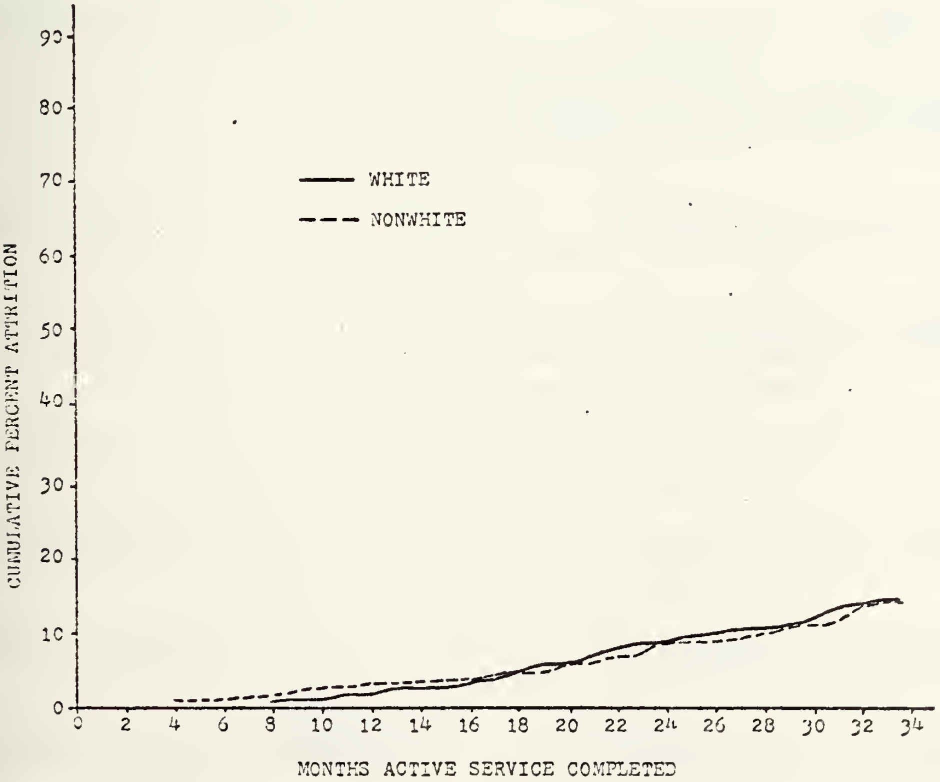


b. NONGENDET Personnel

Figure 15. Attrition over time by recruit quality index for GENDET/NONGENDET control group personnel



a. GENDET Personnel



b. NONGENDET Personnel

Figure 16. Attrition over time by race for GENDET/ NONGENDET control group personnel

Table 14

Definition of Variables Used in the Correlational Analyses

Condition (DEX)* = 1, if recruit was in the experimental group; 0, if the recruit was in the control group.

Years Education (YEARSED) = 1, for each year of education completed by the recruit.

Sex (DSEX)* = 1, if the recruit is male; 0, if recruit is female.

White (DRACE)* = 1, if white; 0 if nonwhite.

Single (DSINGLE)* = 1, if recruit has no dependents, 0 if recruit has dependents.

AFQT = Armed Forces Qualification Test score.

Age = Age at entry.

Air Squadron (DAIR)* = 1, if recruit is assigned to an air squadron; 0 if he is not (see Table 1 for a more detailed description of this variable and the next 5).

Ship (DSAC)* = 1, if recruit is assigned to a ship, 0 if not.

Sea (DSEA)* = 1, if assigned to ships other than defined by DSAC; 0, if recruit is not assigned.

CV (DCV)* = 1, if assigned to a carrier (CV), 0 is not.

Sub (DSUB)* = 1, if assigned to a submarine, 0 if not.

Shore (DSHOR)* = 1, if assigned to shore duty, 0 if not.

General Detail (DGENDET)* = 1, if assigned to GENDET duties, 0 if not.

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*Dummy variable

Table 14 (Cont'd)

Age 17 (DAGE 17)* = 1, if at entry recruit is younger than 18 years at entry, 0 if 18 or older.

GED (DGED)* = 1, if recruit entered service with a GED, 0 if didn't.

Non-HS graduate (DNONE)* = 1, if did not receive a HS diploma, 0 if did.

HS plus (DHSP)* = 1, if attended college, 0 if did not.

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*Dummy variable

Table 15

Correlation Matrix for Experimental Group Personnel

	DLOSS	DLOS1	DEX	YEARSED	DSEX	DRACE	DSINGLE	AFQT	AGE	DHSP
DLOSS	1.00000	0.53375	99.00000	-0.13683	0.10971	0.08766	-0.02088	-0.03706	-0.08299	-0.02134
DLOS1	0.53375	1.00000	99.00000	-0.15602	0.09277	0.04783	-0.05682	-0.08809	-0.05925	-0.03234
DEX	99.00000	99.00000	1.00000	99.00000	99.00000	99.00000	99.00000	99.00000	99.00000	99.00000
YEARSED	-0.13683	-0.15602	99.00000	1.00000	-0.10389	-0.03688	-0.04809	0.21376	0.44617	0.42663
DSEX	0.10971	0.09277	99.00000	-0.10389	1.00000	-0.00495	-0.02919	-0.06818	-0.03821	0.00431
DRACE	0.08766	0.04783	99.00000	-0.03688	-0.00495	1.00000	0.02844	0.27079	-0.11729	-0.01887
DSINGLE	-0.02088	-0.05682	99.00000	-0.04809	-0.02919	0.02844	1.00000	-0.02678	-0.29109	-0.02638
AFQT	-0.03706	-0.08809	99.00000	0.21376	-0.06818	0.27079	-0.02678	1.00000	0.11211	0.10536
AGE	-0.08299	-0.05925	99.00000	0.44617	-0.03821	-0.11729	-0.29109	0.11211	1.00000	0.29063
DHSP	-0.02134	-0.03234	99.00000	0.42663	0.00431	-0.01887	-0.02638	0.10536	0.29063	1.00000
DNONE	0.17184	0.16470	99.00000	-0.59209	0.10593	-0.03027	0.01017	-0.18718	-0.26234	-0.08364
DGED	0.06672	0.03350	99.00000	-0.21614	0.02789	0.02235	0.02339	0.01310	-0.08595	-0.04911
DAIR	-0.14516	-0.17183	99.00000	0.04804	0.03498	-0.00927	-0.04098	0.01014	0.01565	-0.00730
DSAC	-0.05127	-0.25116	99.00000	-0.04781	0.11691	-0.01692	0.06018	-0.04914	-0.04287	-0.01637
DSEA	-0.15306	-0.18682	99.00000	0.05447	-0.03472	-0.02588	0.00452	-0.02699	0.02672	0.04411
DSUB	-0.09298	-0.14062	99.00000	0.00069	0.04389	0.03172	0.01167	0.05650	-0.01221	-0.02305
DCV	-0.00327	-0.10403	99.00000	-0.00733	0.05965	-0.03319	0.03122	-0.03133	-0.00276	-0.01345
DSHOR	0.00602	0.04248	99.00000	0.09549	-0.21518	0.03064	-0.02635	0.08737	0.05888	0.02358
DGENDET	0.36312	0.63014	99.00000	-0.22174	0.08162	-0.06355	-0.02130	-0.22450	-0.06616	-0.05616
TAFMS	-0.78395	-0.88958	99.00000	0.16668	-0.12565	-0.06085	0.05325	0.08054	0.07101	0.02284

	DAIR	DSAC	DSEA	DSUB	DCV	DSHOR	DGENDET	TAFMS	DNONE	DGED
DLOSS	-0.14516	-0.05127	-0.15306	-0.09298	-0.00327	0.00602	0.36312	-0.78395	0.17184	0.06672
DLOS1	-0.17183	-0.25116	-0.18682	-0.14062	-0.10403	0.04248	0.63014	-0.88958	0.16470	0.03350
DEX	99.00000	99.00000	99.00000	99.00000	99.00000	99.00000	99.00000	99.00000	99.00000	99.00000
YEARSED	0.04804	-0.04781	0.05447	0.00069	-0.00733	0.09549	-0.22174	0.16668	-0.59209	-0.21614
DSEX	0.03498	0.11691	-0.03472	0.04389	0.05965	-0.21518	0.08162	-0.12565	0.10593	0.02789
DRACE	-0.00927	-0.01692	-0.02588	0.03172	-0.03319	0.03064	-0.06355	-0.06085	-0.03027	0.02235
DSINGLE	-0.04098	0.06018	0.00452	0.01167	0.03122	-0.02635	-0.02130	0.05325	0.01017	0.02339
AFQT	0.01014	-0.04914	-0.02699	0.05650	-0.03133	0.08737	-0.22450	0.08054	-0.18718	0.01310
AGE	0.01565	-0.04287	0.02672	-0.01221	-0.00276	0.05888	-0.06616	0.07101	-0.26234	-0.08595
DHSP	-0.00730	-0.01637	0.04411	-0.02305	-0.01345	0.02358	-0.05616	0.02284	-0.08364	-0.04911
DNONE	-0.04262	0.04847	-0.03198	-0.01775	0.01865	-0.10935	0.26874	-0.20067	1.00000	-0.14855
DGED	-0.04015	0.02274	-0.02869	-0.00070	-0.00676	0.02335	0.03944	-0.04486	-0.14855	1.00000
DAIR	1.00000	-0.12306	-0.06011	-0.04620	-0.06279	-0.14471	-0.16935	0.18386	-0.04262	-0.04015
DSAC	-0.12306	1.00000	-0.15533	-0.11940	-0.16227	-0.37397	-0.10901	0.20763	0.04847	0.02274
DSEA	-0.06011	-0.15533	1.00000	-0.05832	-0.07926	-0.18266	-0.13997	0.20691	-0.03198	-0.02869
DSUB	-0.04620	-0.11940	-0.05832	1.00000	-0.06092	-0.14041	-0.12691	0.16211	-0.01775	-0.00070
DCV	-0.06279	-0.16227	-0.07926	-0.06092	1.00000	-0.19081	0.00456	0.08041	0.01865	-0.00676
DSHOR	-0.14471	-0.37397	-0.18266	-0.14041	-0.19081	1.00000	-0.07725	-0.02433	-0.10935	0.02335
DGENDET	-0.16935	-0.10901	-0.13997	-0.12691	0.00456	-0.07725	1.00000	-0.61631	0.26874	0.03944
TAFMS	0.18386	0.20763	0.20691	0.16211	0.08041	-0.02433	-0.61631	1.00000	-0.20067	-0.04486

Note: This table is based on men and women with four years obligated service. N = 2354.

Table 16

Correlation Matrix For Control Group Personnel

	DLOSS	DLOSS1	DEX	YEARSEC	DSEX	DRACE	DSINGLE	AFQT	AGE	DHSP
DLOSS	1.00000	0.64410	99.00000	-0.20700	-0.06143	0.01353	-0.03511	-0.05115	-0.02876	0.01060
DLOSS1	0.64410	1.00000	99.00000	-0.13511	-0.02229	0.02276	-0.05653	-0.02243	-0.00350	0.02380
DEX	99.00000	99.00000	1.00000	99.00000	99.00000	99.00000	99.00000	99.00000	99.00000	99.00000
YEARSEC	-0.20700	-0.13511	99.00000	1.00000	-0.09632	-0.04401	-0.08893	0.18697	0.45722	0.40305
DSEX	-0.06143	-0.02229	99.00000	-0.09632	1.00000	-0.03535	-0.03148	-0.03807	-0.08496	-0.06800
DRACE	0.01353	0.02276	99.00000	-0.04401	-0.03535	1.00000	0.03448	0.28076	-0.08029	-0.00428
DSINGLE	-0.03511	-0.05653	99.00000	-0.08893	-0.03148	0.03448	1.00000	-0.03785	-0.29265	-0.04927
AFQT	-0.05115	-0.02243	99.00000	0.18697	-0.03807	0.28076	-0.03785	1.00000	0.13256	0.05422
AGE	-0.02876	-0.00350	99.00000	0.45722	-0.08496	-0.08029	-0.29265	0.13256	1.00000	0.29129
DHSP	0.01060	0.02380	99.00000	0.40305	-0.06800	-0.00428	-0.04927	0.05422	0.29129	1.00000
DNONE	0.22657	0.16553	99.00000	-0.61060	0.11017	-0.00781	0.07010	-0.13159	-0.24959	-0.06042
DGED	0.11127	0.06285	99.00000	-0.25696	-0.00476	0.00380	-0.16342	-0.00323	-0.05765	-0.03939
DAIR	-0.12383	-0.10810	99.00000	0.05616	0.05621	0.00818	-0.02491	-0.00676	0.00320	-0.03391
DSAC	-0.15324	-0.23491	99.00000	-0.06915	0.14169	-0.02929	0.03130	-0.04591	-0.05049	-0.04799
DSEA	-0.10338	-0.12862	99.00000	-0.01168	0.00843	-0.05331	0.00742	-0.01543	-0.03434	-0.02581
DSUB	-0.07726	-0.11703	99.00000	0.02813	0.05815	0.03007	0.02444	0.03184	0.00307	0.03405
DCV	-0.07674	-0.12047	99.00000	-0.02234	0.06431	0.00521	0.02861	-0.03059	-0.01030	-0.00075
DSHOR	0.07846	0.04814	99.00000	0.08787	-0.22615	0.02228	-0.01285	0.05891	0.04428	0.02059
DGENDET	0.47205	0.51379	99.00000	-0.23984	0.01867	-0.03111	-0.02003	-0.21807	-0.05545	0.00305
TAFMS	-0.85315	-0.90568	99.00000	0.17827	0.05156	-0.02284	0.04933	0.04101	0.00776	-0.02339

	DAIR	DSAC	DSEA	DSUB	DCV	DSHOR	DGENDET	TAFMS	DNONE	DGED
DLOSS	-0.12383	-0.15324	-0.10338	-0.07726	-0.07674	0.07846	0.47205	-0.85315	0.22657	0.11127
DLOSS1	-0.10810	-0.23491	-0.12862	-0.11703	-0.12047	0.04814	0.51379	-0.90568	0.16553	0.06285
DEX	99.00000	99.00000	99.00000	99.00000	99.00000	99.00000	99.00000	99.00000	99.00000	99.00000
YEARSEC	0.05616	-0.06915	-0.01168	0.02813	-0.02234	0.08787	-0.23984	0.17827	-0.61060	-0.25696
DSEX	0.05621	0.14169	0.00843	0.05815	0.06431	-0.22615	0.01867	0.05156	0.11017	-0.00476
DRACE	0.00818	-0.02929	-0.05331	0.03007	0.00521	0.02228	-0.03111	-0.02284	-0.00781	0.00380
DSINGLE	-0.02491	0.03130	0.00742	0.02444	0.02861	-0.01285	-0.02003	0.04933	0.07010	-0.06342
AFQT	-0.00676	-0.04591	-0.01543	0.03184	-0.03059	0.05891	-0.21807	0.04101	-0.13159	-0.00323
AGE	0.00320	-0.05049	-0.03434	0.00307	-0.01030	0.04428	-0.05545	0.00776	-0.24959	-0.05765
DHSP	-0.03391	-0.04799	-0.02581	0.03405	-0.00075	0.02059	0.00305	-0.02339	-0.06042	-0.03939
DNONE	-0.08621	0.03575	0.00199	-0.01432	0.00828	-0.05902	0.23934	-0.20384	1.00000	-0.13459
DGED	-0.00718	0.01830	-0.02469	-0.01842	0.00489	0.00486	0.10308	-0.08730	-0.13459	1.00000
DAIR	1.00000	-0.16389	-0.07393	-0.06727	-0.07439	-0.17205	-0.11988	0.12480	-0.08621	-0.00718
DSAC	-0.16389	1.00000	-0.18634	-0.16955	-0.18750	-0.43366	-0.02944	0.24042	0.03575	0.01830
DSEA	-0.07393	-0.18634	1.00000	-0.07648	-0.08458	-0.19562	-0.08241	0.12145	0.00199	-0.02469
DSUB	-0.06727	-0.16955	-0.07648	1.00000	-0.07696	-0.17799	-0.10550	0.12001	-0.01432	-0.01842
DCV	-0.07439	-0.18750	-0.08458	-0.07696	1.00000	-0.19684	0.03739	0.11183	0.00828	0.00489
DSHOR	-0.17205	-0.43366	-0.19562	-0.17799	-0.19684	1.00000	-0.09952	-0.06395	-0.05902	0.00486
DGENDET	-0.11988	-0.02944	-0.08241	-0.10550	0.03739	-0.09952	1.00000	-0.55622	0.23934	0.10308
TAFMS	0.12480	0.24042	0.12145	0.12001	0.11183	-0.06395	-0.55622	1.00000	-0.20384	-0.08730

Note: This table is based on men and women with four years obligated service. N = 2244

Table 17

Correlation Matrix for Experimental and Control Groups

	DLOSS	DLOS1	DEX	YEARSED	DSEX	DRACE	DSINGL	AFQT	AGE	DHSP
DLOSS	1.00000	0.61304	0.38358	-0.16466	0.02582	0.04202	-0.01628	-0.05031	-0.05609	0.00240
DLOS1	0.61304	1.00000	0.26591	-0.14773	0.04425	0.03202	-0.04690	-0.06453	-0.03739	-0.00451
DEX	0.38358	0.26591	1.00000	-0.02182	0.01256	-0.01454	0.02552	-0.02520	-0.01007	0.02252
YEARSED	-0.16466	-0.14773	-0.02182	1.00000	-0.10020	-0.03976	-0.06804	0.20154	0.45094	0.42159
DSEX	0.02582	0.04425	0.01256	-0.10020	1.00000	-0.02015	-0.03005	-0.05333	-0.06142	-0.02877
DRACE	0.04202	0.03202	-0.01454	-0.03976	-0.02015	1.00000	0.03104	0.27581	-0.10343	-0.01271
DSINGLE	-0.01628	-0.04690	0.02552	-0.06804	-0.03005	0.03104	1.00000	-0.03324	-0.29146	-0.03625
AFQT	-0.05031	-0.06453	-0.02520	0.20154	-0.05333	0.27581	-0.03324	1.00000	0.12210	0.09943
AGE	-0.05609	-0.03739	-0.01007	0.45094	-0.06142	-0.10343	-0.29146	0.12210	1.00000	0.29004
DHSP	0.00240	-0.00451	0.02252	0.42159	-0.02877	-0.01271	-0.03625	0.09943	0.29004	1.00000
DNONE	0.20666	0.17545	0.06514	-0.60017	0.10346	-0.01779	0.04075	-0.16746	-0.25770	-0.07210
DGED	0.08781	0.04798	0.01681	-0.23466	0.01710	0.01341	-0.01452	0.03485	-0.07496	-0.04440
DAIR	-0.13670	-0.14403	-0.03478	0.05240	0.04587	0.00023	-0.03304	0.00217	0.00954	-0.02074
DSAC	-0.11729	-0.24695	-0.05773	-0.05641	0.12876	-0.02215	0.04338	-0.04795	-0.04595	-0.03213
DSEA	-0.12331	-0.15757	-0.01341	0.02344	-0.01275	-0.03914	0.00569	-0.02087	-0.00319	0.01154
DSUB	-0.09645	-0.13439	-0.04912	0.01558	0.05094	0.03133	0.01753	0.04422	0.00108	-0.00070
DCV	-0.03815	-0.10683	-0.00368	-0.01419	0.06194	-0.01456	0.02974	-0.03086	-0.01669	-0.00775
DSHOR	0.03565	0.04068	-0.00800	0.09197	-0.22071	0.02672	-0.02444	0.07360	0.05190	0.02197
DGENDET	0.44944	0.59832	0.16961	-0.22969	0.05213	-0.05019	-0.01539	-0.22720	-0.06192	-0.02533
TAFMS	-0.83761	-0.89971	-0.34792	0.16846	-0.04414	-0.03598	0.03895	0.06726	0.04347	-0.00449

	DAIR	DSAC	DSEA	DSUB	DCV	DSHOR	DGENDET	TAFMS	DNONE	DGED
DLOSS	-0.13670	-0.11729	-0.12331	-0.09645	-0.03815	0.03565	0.44944	-0.83761	0.20666	0.08781
DLOS1	-0.14403	-0.24695	-0.15757	-0.13439	-0.10683	0.04068	0.59832	-0.89971	0.17545	0.04798
DEX	-0.03478	-0.05773	-0.01341	-0.04912	-0.00368	-0.00800	0.16961	-0.34792	0.06514	0.01681
YEARSED	0.05240	-0.05641	0.02344	0.01558	-0.01419	0.09197	-0.22969	0.16846	-0.60017	-0.23466
DSEX	0.04587	0.12876	-0.01275	0.05094	0.06194	-0.22071	0.05213	-0.04414	0.10346	0.01710
DRACE	0.00023	-0.02215	-0.03914	0.03133	-0.01456	0.02672	-0.05019	-0.03598	-0.01779	0.01341
DSINGLE	-0.03304	0.04338	0.00569	0.01753	0.02974	-0.02444	-0.01539	0.03895	0.04075	-0.01452
AFQT	0.00217	-0.04795	-0.02087	0.04422	-0.03086	0.07360	-0.22720	0.06726	-0.16746	0.03485
AGE	0.00954	-0.04595	-0.00319	0.00108	-0.01669	0.05190	-0.06192	0.04347	-0.25770	-0.07496
DHSP	-0.02074	-0.03213	0.01154	-0.00070	-0.00775	0.02197	-0.02533	-0.00449	-0.07210	-0.04440
DNONE	-0.08584	0.03833	-0.01715	-0.01897	0.01353	-0.08618	0.26255	-0.21124	1.00000	-0.15175
DGED	-0.02379	0.02003	-0.02693	-0.01074	-0.00125	0.01438	0.07091	-0.06544	-0.15175	1.00000
DAIR	1.00000	-0.14258	-0.06689	-0.05640	-0.06858	-0.15832	-0.14735	0.15595	-0.08584	-0.02379
DSAC	-0.14258	1.00000	-0.17020	-0.14351	-0.17448	-0.40282	-0.07934	0.22785	0.03833	0.02003
DSEA	-0.06689	-0.17020	1.00000	-0.06733	-0.08186	-0.18898	-0.11230	0.16073	-0.01715	-0.02693
DSUB	-0.05640	-0.14351	-0.06733	1.00000	-0.06902	-0.15935	-0.12191	0.14725	-0.01897	-0.01074
DCV	-0.06858	-0.17448	-0.08186	-0.06902	1.00000	-0.19374	0.01923	0.08991	0.01353	-0.00125
DSHOR	-0.15832	-0.40282	-0.18898	-0.15935	-0.19374	1.00000	-0.08779	-0.03687	-0.08618	0.01438
DGENDET	-0.14735	-0.07934	-0.11230	-0.12191	0.01923	-0.08779	1.00000	-0.60825	0.26255	0.07091
TAFMS	0.15595	0.22785	0.16073	0.14725	0.08991	-0.03687	-0.60825	1.00000	-0.21124	-0.06544

Note: This table is based on men and women with four years obligated service. N = 4598

will be attrition rate) that will be conducted in the next section.

Control Group

Table 16 gives the value of each correlation and the associated level of statistical significance. With DLOS1 (attrition--12 months) as the dependent variable, DGENDET (GENDET) has the highest correlation (.514) of any variable correlated with DLOS1. "YEARSED" (years of education) also shows a significant relationship ($r = .135$, $p < .01$) between years of education and attrition.[10] DSAC (shipboard duty) and DLOS1 are somewhat related ($r = .153$, $p < .01$) to each other. It is interesting to note that sex(DSEX) and RACE (DRACE) were not found to be significantly related to short term (12 months) attrition. The correlations of variables with long term attrition (DLOSS--34 months attrition) showed basically the same relationships as they did with the short term (DLOS1) counterpart, with a few exceptions. Sex ($r = -.061$; $p < .01$) and AFQT ($r = -.051$; $p < .01$) are significant in the examination of long range attrition (34 months) but were not significant at the 12 month interval.

Experimental Group

DGENDET remains the most significant explanatory variable for both short and long range attrition ($r = .630$, $p < .01$

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[10] Due to the large sample sizes, almost all correlations are statistically significant in this study.

and $r = .363$; $p < .01$, respectively). The big difference between the control and experimental samples, is that in the experimental sample, sex ($r = .110$; $p < .01$) and race ($r = .088$; $p < .01$) were found to be significantly related to short term attrition; they were not significant in the control group.

Regression Analyses of Attrition

Regression analyses in this study are primarily concerned with controlling for other factors in order to evaluate the contribution of a specific set of variables to the value of the dependent variable (attrition). The differences between the test and control groups (e.g., on age at enlistment) were documented in Chapter 3. These differences indicate a technique such as multiple regression analysis should be used in analyzing the outcomes of VOLOUT II. The second purpose of regression analysis is as a tool for predicting enlisted attrition, but this is only of secondary importance since many other researchers (such as Lockman) have produced excellent models for predicting first-term attrition. Multiple regression is required in analyzing attrition, because simple bivariate regression analysis of attrition on, say, education level ignores the fact that educational level covaries with race, AFQT, and age; that is, the more educated one is, the more likely it is he is also an older white with a higher AFQT score. Race, AFQT score, and age may themselves affect attrition. Therefore, one would want to examine the impact

of educational level while controlling statistically for variation in race, AFQT score, age, and other variables related to attrition rate. Multiple regression provides partial regression coefficients which allow one to gauge the importance of each predictor variable. Emphasis, in this section then, is on the examination of particular relationships within a multivariate context.

The results presented here (Tables 18 and 19) are based on a forward step-wise regression procedure. This procedure considers all available variables and selects variables into the regression equation in order of their joint value in predicting the dependent variable. The first variable entered into the equation is the best single predictor of the dependent variable. The second variable is the single variable which adds the most predictive power to the regression equation after the first variable is considered. This procedure continues in steps as long as added variables are statistically stignificant ($F > 3.84$; $p \leq .05$).

Cohen and Cohen [1975] warn against using step-wise regression to blindly select variables without a priori theories and research. This, however, was not done and the variables were selected from the literature review before any multiple regression was conducted.

Table 18 is based on traditional variables considered significant in explaining attrition. Gunderson [1963] in his literature review considered the best and most consistent predictors of adaption to military to be age, intelligence,

Table 18

Regression Results for Traditional Attrition Variables

	Attrition		Months of Service	
	(1) 12 months	(2) 34 months	(3) 34 months	(4) 40 months
Constant	0.986	1.216	5.55	-.274
	B	B	B	B
Condition	0.239**	0.382**	-9.37**	-11.67**
Years Education	-0.058**	-0.074**	2.12**	2.41**
Sex	--	--	--	--
White	0.057**	0.060**	-1.98**	-2.28**
Single	-0.128**	-0.081**	3.04**	4.06**
AFQT	-0.001**	--	0.034**	0.038**
Age	--	--	-0.214**	--
R^2	0.098	0.174	0.155	0.164
F statistic	99.45**	243.10**	119.82**	181.39**
N	4598	4598	4598	4598

*Significant at .05 level

**Significant at .01 level

--Not significant (not entered into equation)

NOTE: Months of service (for Equations 3 and 4) was coded as the total months served before attriting from the Navy. Since not all of the personnel had attrited at the end of the 33rd month period, it was necessary to arbitrarily assign a value for the months of service for non-attritees. In Equation 3 a value of 34 was assigned, while in Equation 4 a value of 40 was coded for each stayer. These two assumptions will slightly affect the regression coefficients.

Table 19

Attrition Regression Results with Situational Variables Included as Predictors

	Attrition		Months of Service	
	(1) 12 months	(2) 34 months	(3) 34 months	(4) 40 months
Constant	0.499	0.797	16.30	19.32
	B	B	B	B
Condition	0.116**	0.298**	-5.79**	-7.55**
Years Education	-0.012**	-0.037**	0.65**	0.86**
Sex	0.129**	--	-3.53**	-3.93**
White	0.053**	0.072**	-1.55**	-1.90**
Single	-0.043*	--	1.13*	--
AFQT	--	--	-0.02*	-0.02*
Age	--	--	--	--
Air Squadron	-0.579**	-0.363**	16.92**	19.07**
Ship	-0.578**	-0.262**	15.94**	17.55**
Sea	-.591**	-0.342**	16.93**	18.98**
CV	-0.597**	-0.269**	16.23**	17.90**
Sub	-.577**	-0.293**	16.96**	18.77**
Shore	-.355**	-0.143**	9.88**	10.72**
General Detail	0.347**	0.292**	-10.47**	-12.26**
R^2	0.566	0.343	0.590	0.560
F statistic	500.38**	241.49**	510.17**	491.54**
N	4598	4598	4598	4598

*Significant at .05 level.

**Significant at .01 level.

--Not significant (not entered into the equation)

NOTE: Equations 3 and 4 are coded by the same method as used in Table 18.

and schooling completed. Lockman [1976] added the explanatory variable of race. However, he later revised his Screen model and expanded the less than 12 years of education level into 11 years and less than 11 years levels, whereupon the race variable dropped out [Lockman, Note 10].

Table 19, besides the "traditional" variables, includes Navy occupational and situational variables. Gunderson and Hoiberg [1977] concluded that a great deal of research has been devoted to identifying individual characteristics that predict attrition, but relatively little to organizational factors that affect attrition. The addition of these situational variables added greatly to the predictive power of the attrition prediction model. Using the traditional model Table 18, Equation 1), the addition of the situational variables to the model (Table 19, Equation 1) could explain 56.6 percent of the variance. However, further research is needed to validate these findings by applying them to new cohort samples to determine how well (determined by correlation analysis) they predict attrition.

Additionally, Tables 18 and 19 include the dependent variable LOS (length of service). In the equation labeled "Months of Service," non-leavers were given a value based on either the assumption that they stay in only one month after the last leaver is attrited (34 months), or that, on average, they leave at the midpoint between the last leaver and the end of his 4-year active obligation (40 months). These of

course are arbitrary assumptions, but they should err on the conservative side because it is assumed that most of the personnel who have not already attrited at the 34 month period will complete their 4 year (48 months) military obligation. In Equation 3 (Tables 18 and 19) personnel who were not attrited were assigned a value of 34 for total months of service, and in Equation 4 (Tables 18 and 19) stayers were coded a value of 40 for total months of service. Less arbitrary are the values assigned to non-stayers which are obtained by finding each person's LOS value. For example, if a person attrited in the sixth month of service, he was assigned an LOS value of six months.

Definition of Regression Variables

The following explanatory variables were postulated to be significantly related to attrition:

Condition (DEX)* = 1, if recruit was in the experimental group; 0, if the recruit was in the control group.

Years Education (YEARSED) = 1, for each year of education completed by the recruit.

Sex (DSEX)* = 1, if the recruit is male; 0, if recruit is female.

White (DRACE)* = 1, if white; 0 if nonwhite.

Singel (DSINGLE)* = 1, if recruit has no dependents, 0 if recruit has dependents.

AFQT = Armed Forces Qualification Test score

Age = Age at entry.

Air Squadron (DAIR)* = 1, if recruit is assigned to an air squadron; 0 if he is not (see Table 1 for a more detailed description of this variable and the next 5).

Ship (DSAC)* = 1, if recruit is assigned to a ship, 0 if not.

Sea (DSEA)* = 1, if assigned to ships other than defined by DSAC; 0, if recruit is not assigned.

CV (DCV)* = 1, if assigned to a carrier (CV), 0 if not.

Sub (DSUB)* = 1, if assigned to a submarine, 0 if not.

Shore (DSHOR)* = 1, if assigned to shore duty, 0 if not.

General Detail (DGENDET)* = 1, if assigned to GENDET duties, 0 if not.

AGE 17 (DAGE 17)* = 1, if at entry recruit is younger than 18 years at entry, 0 if 18 or older.

GED (DGED)* = 1, if recruit entered service with a GED, 0 if didn't.

Non-HS graduate (DNO E)* = 1, if did not receive a HS diploma, 0 if did.

HS plus (DHSP)* = 1, if attended college, 0 if did not.

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*Dummy variable

Experimental vs. Control Groups

Table 18 shows the results of the regression analyses for the traditional independent variables. Equation 1 (attrition during the first 12 months of enlistment) resulted in a low R^2 of only .098 ($p < .01$). Equation 2 (attrition during

the first 34 months) resulted in a higher R^2 of .174 ($p < .01$). The variable "Condition" (Equation 2) indicates that VOLOUT alone, after statistically controlling for all of the other predictor variables, contributed to an attrition differential of approximately 38 percent. In other words, if the experimental and control groups were exactly identical (demographically and situationally identical) the VOLOUT group would have an attrition differential of +38 percent. This is in contrast to the actual differential of 40.1 percent (71.6% - 31.5%)[11] found between the control and experimental groups (see Table 9). This difference occurred because the regression sample was slightly larger and the difference between VOLOUT and control attrition slightly smaller, than the sample shown in Table 9. The regression sample included females, however, a dummy variable was added to control statistically for the effects of sex (DSEX).

The fact that the experimental group had more GENDETS and was as a group less educated (see Demographics section) than the control group may have slightly overestimated the negative impact of the VOLOUT program. In fact, when the GENDET variable is added (Equation 2, Table 19) the coefficient of the Condition variable is smaller than when GENDET is not considered (.298 vs. .382). The "condition" coefficients for Tables 18 and 19 are different because the additional

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[11] Experimental attrition rate minus the control group attrition rate.

situational variables of GENDET and initial duty assignment in Table 19 add to the explained variance (.343 in Table 19 vs. .174 in Table 18), and, therefore, reduce the "condition" coefficient. Even after statistically adjusting for the demographical and situational differences between the two study groups, the VOLOUT program experienced significantly ($p < .01$) higher attrition rates than did the control group at both the 12 and the 34 month periods. Not only did VOLOUT front-load attrition, it was associated with high attrition rates even near the end of the three year enlistment period. On average, giving a Navy recruit the VOLOUT option will probably result in five to seven fewer months served in the Navy per man through the first 34 months of the enlistment period (estimate based on Equations 3 and 4, Table 19).

Age at Enlistment

In almost every regression equation presented thus far, age was not a significant variable in predicting attrition. This was contrary to Lockman's [1976] results which did show age to be a significant explanatory variable. However, this difference is due more to how age was used as a predictor. Lockman's age analysis showed a somewhat quadratic relationship between age and attrition. The youngest recruit (17 years) had the highest attrition rate, the 18-19 year old had the lowest rate, while the older recruit (21 years or older) experienced higher attrition rates [Lockman, 1976]. This is similar to the findings in Table 10. In the control group (34 months) attrition was initially high (56.1% for

17 year olds), dropped (27.9% for 19 year olds), and then rose again (29.0% for 21 year olds or older). Figure 17 does show indications of a quadratic relationship between age and attrition. In fact, AGE + AGE^2 was inserted into the regression equation as a predictor, and was significantly related to attrition ($p < .01$). However, since its addition did not result in a higher percentage of explained attrition variance, it was not used in the prediction equation.

Creating a dummy variable for Age yielded a more successful regression result. Recruits who were younger than 18 years were assigned a value of 1, while those who were 18 or older were coded as 0 (DAGE 17). Tables 20 and 21 show the results with the dummy variable DAGE 17 added to both traditional and nontraditional regression equations for predicting attrition. This change generally resulted in slightly higher R^2's than when age was in the equations. Whereas in the equations reported in Tables 18 and 19, age only entered into one of the equations, the dummy variable DAGE 17 entered into the equations reported in Tables 20 and 21 six times, but all R^2's are changed only slightly from their counterparts in Tables 18 and 19.

As expected, based on the literature review, recruits that were not at least 18 years old, were more likely to attrite than were older ($\geq$ 18 years old) recruits. The young recruit ($<$ 18 years old) had approximately an 8 percent higher probability of attriting (34 months) than the base group ($\geq$ 18 years old; see Equation 2, Table 21). Based on

Table 20

Regression Results for Traditional Variables with a Modified Age Predictor

	Attrition		Months of Service	
	(1) 12 months	(2) 34 months	(3) 34 months	(4) 40 months
Constant	.986	1.07	3.48	3.03
	B	B	B	B
Condition	.239**	.379**	-9.35**	-1.62**
Years Education	-.058**	-.059**	1.77**	2.12**
Sex	--	--	--	--
White	.057**	.072**	-1.90**	-2.34**
Single	-.128**	-.092**	3.71**	4.26**
AFQT	-.001**	-.001**	.04**	.04**
Age 17	--	.099*	-1.60**	-2.20**
R^2	.098**	.178	.154	.166
F statistic	99.45**	167.01**	140.04**	153.13**
N	4598	4598	4598	4598

*Significant at .05 level

**Significant at .01 level

--Not significant (not entered into the equation)

Table 21

Attrition Regression Results with Situational and Modified Age Variables Included as Predictors

	Attrition		Months of Service	
	(1) 12 months	(2) 34 months	(3) 34 months	(4) 40 months
Constant	.499	.672	17.80	19.95
	B	B	B	B
Condition	.116**	.296**	-5.77**	-7.55**
Years Education	-.012**	-.027**	.51**	.68**
Sex	.129**	--	-3.51**	-3.83**
White	.053**	.073**	-1.58**	-1.98**
Single	-.043*	--	1.23**	1.48**
AFQT	--	--	-.02*	-.02**
Age 17	--	.081**	-1.08**	-1.56**
Air Squadron	-.579**	-.362**	16.91**	19.08**
Ship	-.578**	-.265**	15.98**	17.56**
Sea	-.591**	-.343**	16.96**	19.00**
CV	-.597**	-.272**	16.28**	17.90**
Sub	-.577**	-.295**	16.98**	18.75**
Shore	-.355**	-.145**	9.90**	10.74**
General Detail	.347**	.290**	-10.43**	-12.18**
R^2	.566	.347	.592	.563
F statistic	500.35**	221.87**	474.85**	423.34**
N	4598	4598	4598	4598

*Significant at .05 level

**Significant at .01 level

--Not significant (not entered into the equation)

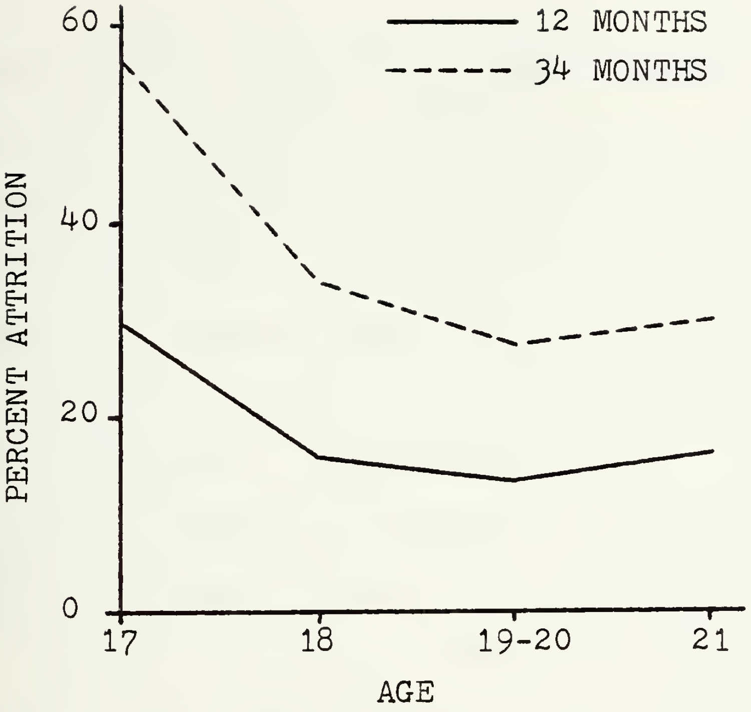

Figure 17. Attrition rates by recruit enlistment age at 12 and 34 months of active service for control group personnel.

the regression results (34 months), it was also expected that the young (< 18 year old) recruit, on average, would serve one-two months (Equations 3, 4; Table 21) less than would recruits in the base group ($\geq$ 18 years old).

Racial Composition

Race (white/nonwhite was a significant predictor variable in all of the equations. As shown in Table 18 (equation 1) the race coefficient was .057 ($p < .01$). (5.7% more whites than nonwhites can be expected to attrite in 12 months, other things being equal.) The proposed explanation, previously mentioned, that whites perceived more civilian job opportunities than do minorities, may warrant the assessment of expectations and intentions of enlisted personnel. While not

addressed in this study, Mobley, Hand, Baker, and Meglino [1979] examined alternate role perceptions in their analysis of Marine Corps recruit training turnover behavior. Using the role choice model, a variant of the generalized expectancy model of organizational behavior , they included measures of attraction of civilian roles and perceived chances of currently attaining a civilian work role. It was found that dropouts, when compared to recruit training graduates, saw a significantly higher chance of being able to successfully secure a civilian work role. Thus, the relatively high unemployment rates experienced by young black civilians, and the lag in the earnings opportunities for full-time employed blacks [Cooper, 1977] provide a plausible explanation for significantly less attrition by nonwhites as compared to whites. Low expectations of finding civilian jobs may have influenced the attrition rate of nonwhites in the 1970's.

Number of Dependents

Table 18, Equation 1, shows that having no dependents at entry is associated with an increase in the probability of serving 1 year ($p < .01$). This difference in attrition rates between recruits having dependents vs. those having new dependents may be at least partly explained by problems faced by married recruits. Some of the problems married recruits have were identified by the Navy Recruiting Command [1979]:

(1) The recruit is not entitled to transportation of dependents or household goods for enlistees assigned to

activities located in CONUS. Household goods and dependents are moved at the recruit's expense.

(2) The recruit is unlikely to get government housing upon arrival at his new duty station.

After 34 months, the dependency variable is still significant ($p < .01$), but the coefficient (-.081) is smaller. Two possible reasons are:

(1) All data are obtained at entry and some of the recruits that were single at entry are now married but are still coded as single.

(2) The summation of pecuniary and nonpecuniary benefits provided to married personnel become positive, or less negative, after training and reporting to initial assignment.

Years of Formal Education Completed

As expected, years of education negatively correlated with attrition. As shown in Table 18, years of education negatively correlated with attrition ($B = -.058$; $p < .01$) at the end of one year and also at the end of the 34 month period ($B = -.074$; $p < .01$).

Mental Aptitude

There were no surprises with the mental aptitude regression results. The AFQT coefficient remained fairly constant regardless of what other variables were included in the equation (see Tables 18, 19, Equations 1 and 2). The regression coefficient for AFQT equalled -.001 ($p < .01$) for both the 12 and 34 month equations with the non-traditional variables

added (Table 19). In Table 18 (traditional variables) the regression coefficient for AFQT was -.001 ($p < .01$) at the end of 12 months, but was not statistically significant at the end of 34 months, even though the regression coefficient also equalled -.001.

Initial Fleet Assignment

As shown in Table 19, Equation (2), the initial fleet assignment correlations with attrition at 34 months are compatible with the cumulative-attrition-over time plots in Figure 10. Those personnel initially assigned to air squadrons had a negative regression coefficient of .363 while shore duty assignees had a negative regression coefficient of .143. The fact that shore duty assignment for first-term personnel leads to the highest attrition rate, when compared to any other sea duty-type assignment, is noteworthy. A possible explanation may be that personnel assigned to shore duty initially become disgruntled because of unmet expectations. This seems particularly plausible because of Navy advertising slogans like "It's an adventure," or "... see the world." In any case, as shown in Table 19, Equations (3) and (4), initial assignment to shore duty will, on average, extend the person's retention 10-11 months, whereas assignment to a sea-duty unit will extend survival from 16-18 months for a

ship to 17-19 months for an air squadron.[12] Perhaps more consideration could be given to placement of first-term personnel in sea duty units for their initial fleet assignments.

GENDET/NONGENDET

At the end of 12 months, the GENDET coefficient equalled .347 (Table 19), i.e., other things being equal, the probability of attrition for a GENDET was 34.7 percent higher than that for a nonGENDET. After 34 months the coefficient dropped to .292. A possible explanation for this is that many of the original GENDETS were no longer GENDETS by the end of the 34 month reporting period. Programs such as the non-designated striker board enable the sailor to strike for a specific rate even though he was initially a GENDET and had not attended A school. It is important to realize that the GENDET variable is still significant when quality variables such as AFQT score and education are considered. For example, Table 22 shows that while the average SCREEN score for all of the GENDET personnel gave a reference 81.85 percent chance of survival, the actual sruvival rate was much lower (58.4%). For all recruits, the SCREEN Table does an admirable

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[12] The base group (N = 742) were those who were not given an initial assignment and thus were likely to be the ones who attrited early. A few recruits (N = 64) did not have a coded initial assignment since they received an assignment after the initial assignment data were compiled.

Table 22

Comparison of Navy SCREEN Scores with Actual Mean Survival Rates

	Predicted Score (%) (SCREEN Table)	Actual Score (%) (Mean Survival Rate)	Difference (%)
Control	85.17	84.32	0.85
Experimental	84.08	58.38	25.70
GENDET Only (control)	81.85	58.40	23.45
A School (control)	86.90	97.88	-10.98
CV (control)	84.52	98.80	-14.28
SAC (control)	84.64	97.00	-12.36
AIR (control)	86.51	99.25	-12.74
FN (control)	80.53	75.33	5.20
SN (control)	82.17	48.08	34.09
AN (control)	82.36	75.21	7.15
Males (control)	85.15	84.26	0.89
Females (control)	86.80	90.00	-3.20

NOTE: Predictive Score from SCREEN Table, Navy Recruiting Manual. Each person was given a SCREEN score, based on his personal characteristics at the time of enlistment. The predicted score is the average of all of these individual scores.

job of predicting (85.2%) the actual survival rate (84.3%). However, initial duty assignment as noted in the regression equations is an important factor even when statistically controlling for other predictor variables. For example, A school attendees had a predicted survival percentage of 86.9 percent, based on their SCREEN scores; yet the mean survival rate was higher (97.88%). Table 23 shows predictive scores for surviving one year in the Navy. The first number in each cell is from Lockman's [1976] SCREEN Table, and the second number is based on Equation 1, Table 18. (See Appendix D for the Assumptions used when computing and comparing SCREEN scores.) The SCREEN prediction and the regression prediction were usually fairly close. For example, both methods (SCREEN, and Equation 1, Table 18) estimate that a single, minority 18 year old with less than 12 years of education, but in MGI, would have an 88 percent chance of surviving the first year. The two estimates have a fairly high correlation ($r = .74$) and the correlation is statistically significant ($p < .01$). Table 25 (based on the regression equation in Table 24) demonstrates a strong indication that the SCREEN Table is not as useful for predicting the survival rates of GENDET recruits. Whereas the SCREEN Table and the regression results based on Table 18, Equation 1 (for both NONGENDETS and GENDETS) were highly correlated ($r = .74$), the SCREEN Table and the model for predicting GENDET attrition (Table 24) were in fact negatively correlated ($r = -.15$;

Table 23

Comparison of Navy SCREEN Table with Actual Attrition Regression Results

		MAJORITY						MINORITY					
Years ED		>12	12	<12	>12	12	<12	>12	12	<12	>12	12	<12
		NO DEP			DEP			NO DEP			DEP		
MG	Age												
I	18-19	99/94	96/88	85/82	95/81	92/75	81/69	99/99	99/94	88/88	98/87	95/81	84/75
	17	97/94	94/88	93/82	93/81	90/75	79/69	99/99	98/94	87/88	97/87	94/81	83/75
	20+	96/94	92/88	81/82	92/81	89/75	78/69	99/99	96/94	85/88	95/87	92/81	83/75
II	18-19	94/92	91/86	80/80	90/79	87/73	76/67	97/98	94/92	83/86	93/85	90/79	79/73
	17	92/92	89/86	78/80	89/79	85/73	74/67	96/98	94/92	82/86	92/85	90/79	78/73
	20+	91/92	88/86	76/80	87/79	84/73	73/67	94/98	91/92	80/86	90/85	87/79	76/73
III U	18-19	91/90	88/84	77/78	87/77	84/71	73/65	95/96	92/90	80/84	91/83	88/77	77/71
	17	90/90	87/84	76/78	86/77	83/71	72/65	93/96	90/90	79/84	89/83	86/77	75/71
	20+	88/90	85/84	74/78	84/77	81/71	70/65	91/96	88/90	77/84	88/83	85/77	73/71
III L	18-19	86/88	83/82	72/76	82/75	79/69	68/63	89/94	86/88	75/82	86/81	83/75	71/69
	17	85/88	81/82	70/76	81/75	78/69	67/63	88/94	85/88	74/82	84/81	81/75	70/69
	20+	83/88	80/82	69/76	79/75	76/69	65/63	86/94	83/88	72/82	82/81	79/75	68/69
IV	18-19	81/87	78/81	67/75	77/74	74/68	63/62	85/93	82/87	70/81	81/80	78/74	67/68
	17	80/87	77/81	66/75	76/74	73/68	62/62	83/93	80/87	69/81	79/80	76/74	65/68
	20+	78/87	75/81	64/75	74/74	71/68	60/62	81/93	78/87	67/81	78/80	75/74	63/68

NOTE: $R = .74$, $p < .01$. The first number in each cell is the SCREEN value, while the second number separated by the slash is based on the regression results in Table 18, Equation 1.

Table 24

Regression Results for Traditional Attrition Variables for GENDET Personnel

	Attrition (12 months)
Constant	.571**
	B
Years Education	-.024**
Sex	--
White	.108**
Single	-.173**
AFQT	+.004**
Age	--
R^2	.107
F statistic	49.07**
N	2044

*Significant at .05 level

**Significant at .01 level

--Not significant (not entered into the equation)

Table 25

Comparison of Navy SCREEN Table with Actual Attrition Regression Results for GENDET Personnel

		MAJORITY						MINORITY					
Years ED		>12	12	<12	>12	12	<12	>12	12	<12	>12	12	<12
		NO DEP			DEP			NO DEP			DEP		
MG	Age												
I	18-19	99/42	96/40	85/38	95/25	92/23	81/21	99/53	99/51	88/49	98/36	95/34	84/32
	17	97/42	94/40	83/38	93/25	90/23	79/21	99/53	98/51	87/49	97/36	94/34	83/32
	20+	96/42	92/40	81/38	92/25	89/23	78/21	99/53	96/51	95/49	95/36	92/34	93/32
II	18-19	94/47	91/45	80/43	90/30	87/28	76/26	97/58	94/56	83/54	93/41	90/39	79/37
	17	92/47	89/45	78/43	89/30	85/28	74/26	96/58	94/56	82/54	92/41	90/39	78/37
	20+	91/47	88/45	76/43	87/30	84/28	73/26	94/58	91/56	80/54	90/41	87/39	76/37
III U	18-19	91/58	88/56	77/53	87/41	84/39	73/36	95/69	92/67	80/64	91/52	88/50	77/47
	17	90/58	87/56	76/53	86/41	83/39	72/36	93/69	90/67	79/64	89/52	86/50	75/47
	20+	88/58	85/56	74/53	84/41	81/39	70/36	91/69	88/67	77/64	88/52	85/50	73/47
III L	18-19	86/62	83/60	72/57	82/45	79/43	68/40	89/73	86/71	75/68	86/56	83/54	71/51
	17	85/62	81/60	70/57	81/45	78/43	67/40	88/73	85/71	74/68	84/56	81/54	70/51
	20+	83/62	80/60	69/57	79/45	76/43	65/40	86/73	83/71	72/68	82/56	79/54	68/51
IV	18-19	81/68	78/66	67/63	77/51	74/49	63/46	85/79	82/77	70/74	81/62	78/60	67/57
	17	80/68	77/66	66/63	76/51	73/49	62/46	83/79	80/77	69/74	79/62	76/60	65/57
	20+	78/68	75/66	64/63	74/51	71/49	60/46	81/79	78/77	67/74	78/62	75/60	63/57

NOTE: R = -0.15, p < .05. The first number in each cell is the SCREEN value, while the second number separated by the slash is based on the regression results in Table 24.

$p < .05$). In fact, there is a statistical difference ($p < .01$) between the two correlations (.74 vs. -.15) [see McNemar, 1969, p. 158]. This indicates that even when controlling for demographical differences (GENDETS, on average, are not as educated and intelligent as their NONGENDET counterparts), GENDETS, in terms of attrition, seem to behave differently from NONGENDETS. Table 19 underscores the need for the Navy to consider other variables that appear to explain this difference in behavior. One problem with only conducting a correlational analysis between the SCREEN scores and the scores derived from the regression model, and ignoring actual demographic data, is that it treats all the paired values as equally likely to be represented by the population of Navy recruits. For example, if each cell in the SCREEN table (SCREEN table based on a cohort sample of 66,000) was equally representative of the recruit population, each cell would contain approximately 367 people (66,000 ÷ 180) but in fact Lockman [1976] found that 32 of the 180 total cells in the SCREEN table were empty. In order to develop a "weighted" correlation, by placing more emphasis on the accuracy of the cells used most often, a correlational analysis was done by assigning each person in the sample a SCREEN score and a survival probability score based on the regression analysis (Tables 18 and 24). This was first done with the control group (N = 2244) comparing the SCREEN score with the attrition model in Table 18 (Equation 1). With actual data

the two models did have a fairly high correlation, r = .76 (compared to .74 in the "unweighted" correlation). However, as with the earlier correlational analysis, the SCREEN model negatively correlated with the regression model (Table 24) when they were used to predict the attrition rates of only GENDET personnel. This analysis resulted in an r value of -.13 (compared to f = -.14 in the "unweighted" correlation analysis) based on a sample of GENDETs (control group only, n = 781). Even with the weighted correlation analysis, it is clear that GENDET attrition, even when controlling for their generally lower education and mental levels, is not predicted accurately by the traditional attrition model (SCREEN).

As was seen, the addition of situational variables raised the ratio of explained variance in predicting attrition from $R^2 = .098$, Table 18, to $R^2 = .566$, Table 19. Additionally, Table 24 shows that there is a positive correlation between AFQT score and attrition for GENDETs. In other words if AFQT is a measure of intelligence, then the more intelligent recruits are more likely to attrite in a GENDET environment. This helps to account for the negative correlation in the two attrition models (SCREEN vs. the equation in Table 24) for GENDET personnel, since the AFQT coefficient in the SCREEN model is negative while in the GENDET regression model it is positive. In fact, sending anyone to a GENDET assignment would be predicted to result, on average, regardless of other personal characteristics, in an estimated 10-12

month shorter enlistment (see Table 19, Equations 3 and 4) than if the person were sent to an A-school assignment.

CONCLUSIONS AND RECOMMENDATIONS

Introduction

Though this study used the VOLOUT II program for its data base, the thrust of this research has been to identify variables predictive of attrition. Selection of demographic variables that explained attritional variances was made easy by the wealth of prior research [see Gunderson, 1977; and Mobley, Griffith, Hand, & Meglino, 1979]. Gunderson [1977] also notes that organizational variables have sometimes been neglected in attrition studies. Herman, Dunham, and Hulin [1975], demonstrated that organizational variables may be better predictors of behavior than demographic or personality variables. The frame of reference provided by these situational variables may influence values, perceptions, and expectations, thus linking organizational variables with individual behavior. For this reason, an attempt was made to include organizational (situational) variables in the study. The prime example was the inclusion of A school/non-A school assignment (GENDET) as an explanatory variable. When GENDET was included in the regression equation (Table 19, Equations 1-4), it was a significant explanatory variable.

Discussion

The following is a discussion of some of the results that were "outstanding" in the sense that they could lead to a

further understanding of attrition and eventually to a resolution of some of the attrition problems found in the Navy.

VOLOUT Option

As described previously in the multiple regression analysis, the experimental group personnel had a much higher attrition rate than those not holding a VOLOUT option. As suggested by Guthrie et al., [1978], it is clear that a blanket voluntary release opportunity is not recommended for controlling and/or front-loading first-term enlisted attrition. After administering exit questionnaires to experimental group attritees from this same sample, Lau [1979] concluded that the existence of the voluntary separation option definitely influenced attrition. He found that many subjects exercised their option merely because it was available, particularly those having a minimum of 180 days active service thereby insuring partial eligibility for the GI Bill and VA benefits. Similar behavior was found in this study; a significantly higher proportion of experimental subjects attrited in the eighteenth month of active service when Full GI Bill entitlement was attained, as was shown in Figures 1b and 12. Considering the attrition rates of 73 percent for general detail personnel after 23 months in VOLOUT I [Guthrie et al., 1978] and the 72 percent after 34 months found in this study, the voluntary-out option as tested is not appropriate as a counter-attrition strategy for the military.

Educational Level

Educational level continues to be one of the most important traditional factors for predicting attrition. High school graduates are, on average, far superior to nongraduates as recruiting prospects. While educational level is strongly related to mental group, it is believed to provide some indication of a person's ability to persevere, to get along with others, to accept authority--traits that are likely to be important for success in the military [Sims, 1974]. It should be noted that while GED certificate holders are better attrition risks than those with no diploma, they should not be equated to high school diploma graduates. For instance, where control group high school graduates are shown in Table 10 to have the lowest 34 month attrition rate (23.7%), the GED holders differed markedly with an attrition rate of 49.4 percent. Tables 26 and 27 show the regression results (traditional and nontraditional variables) with dummy variables created for educational level (see earlier discussion pertaining to the definition of the regression variables). With the traditional variables in the equation (Table 26, Equation 1) the GED attrition coefficient is .089 ($p < .01$) when the reference group is high school graduates. This indicated that, on average, 8.9% more GED holders than high school graduates attrited in 12 months. In fact, the equation including nontraditional predictors (Table 27, Equation 2) shows long-range attrition (34) months for GED holders is no different than that of non-HS graduates ($B = .135$). It also

Table 26

Regression Results for Traditional Attrition Variables with a Modified Educational Credential Included as a Predictor

	Attrition		Months of Service	
	(1) 12 months	(2) 34 months	(3) 34 months	(4) 40 months
Constant	.456	.269	26.18	30.31
	B	B	B	B
Condition	.232**	.370**	-9.08**	-11.30**
Non-HS Grad	.159**	.253**	-6.78**	-8.26**
GED	.088**	.198**	-4.30**	-5.48**
HS Plus	--	--	--	--
Years Ed	-.017*	--	--	--
Sex	--	--	--	--
White	.064**	.071**	-2.19**	-2.68**
Single	-.124**	-.073*	3.35**	3.80**
AFQT	-.001**	--	.03**	.04**
Age	--	--	--	--
R^2	.109	.196	.172	.185
F statistic	79.80**	224.02**	158.47**	173.27**
N	4598	4598	4598	4598

*Significant at .05 level

**Significant at .01 level

--Not significant (not entered into the equation)

Table 27

Attrition Regression Results with Situational and Modified Educational Credential Variables Included as Predictors

	Attrition		Months of Service	
	(1) 12 months	(2) 34 months	(3) 34 months	(4) 40 months
Constant	.499	.337	25.35	29.82
	B	B	B	B
Condition	.116**	.294**	-5.71**	-7.47**
Non-HS Grad	--	.135**	-2.19**	-3.00**
GED	--	.135**	-1.95**	-2.75**
HS Plus	--	--	--	--
Years Ed	-.012**	--	--	--
Sex	.129**	--	-3.46**	-3.75**
White	.053**	.077**	-1.63**	-2.05**
Single	-.043*	--	--	--
AFQT	--	--	-.02*	-.02*
Age	--	--	--	--
Air Squadron	-.579**	-.354**	16.75**	18.87**
Ship	-.578**	-.264**	16.01**	17.59**
Sea	-.391**	-.341**	16.96**	18.99**
CV	-.597**	-.270**	16.29**	17.90**
Sub	-.577**	-.294**	17.01**	18.79**
Shore	-.355**	-.144**	9.91**	10.75**
General Detail	.347**	.277**	-10.27**	-11.95**
R^2	.566	.351	.593	.565
F Statistic	500.38**	227.12**	514.13**	-459.45**
N	4598	4598	4598	4598

*Significant at .05 level

**Significant at .01 level

--Not significant (not entered into the equation)

might be added that the variable GED was significant when forced into the regression equation last. The Defense Manpower Data Center [Note 11], in a study of attrition prior to completion of the first three years of active duty (FY 73-76), found that the attrition of GED holders from the Navy was higher than that of recruits having a high school degree. In the Navy, the three year attrition rate was 26.2 percent for high school graduates, 47.5 percent for GED holders, and 54.9 percent for non-high school graduates with no GEDs. In agreement with Guthrie et al., [1978], this study concurs with the present Recruiting policy that GED certificate holders should not be equated with high school graduates for attrition prediction purposes. However, recruiting selection methods and the associated SCREEN table should be modified to include GED as a separate category so that GED holders are recognized as having a lower 12-month attrition probability than that of non-high school graduates who are not GED holders. Also, the Recruiting Command should "reward" recruiters more for enlisting GED holders over non-high school graduates, but "reward" them less if a GED holder is recruited instead of a high school graduate. However, it should be noted that a GED may be a proxy for motivation and perseverance, and increased emphasis on merely getting more recruits GED-qualified instead of finding people already GED qualified may not result in lower attrition rates for non-high school graduates. If a change in policy resulting in

more pressure to obtain a GED certificate is not established carefully, the effect on attrition reduction may be lost. It is true that GED holders and non-high school graduates have the same attrition coefficients in the nontraditional regression equatio (Table 27, Equation 2; B = .135), but in the traditional equation, using predictors on which the SCREEN table is based, GED holders and non-high school graduates--non-GED holders do have different attrition (12 months) rates (.159 and .089, respectively). Therefore, unless situational variables are included in the Navy SCREEN table, the addition of a separate GED category would result in a different and higher survival probability estimate than that for non-high school graduate--non-GED holders.

Distribution of A School Assignments

Table 5 showed that only 67 percent of the Alpha recruits (considered the most desirable for A school assignment) were actually assigned to A school. (36.4 % of the Bravos, 46.0% of the Charlies, and 15.9 % of the Deltas, were assigned to A schools.) If it is true, as some observers of the AVF claim, that as warfare becomes more dependent on sophisticated technology, military requirements for skilled labor must increase (see Levitan and Alderman, 1977) why are not more Alpha recruits, an apparently scarce resource, assigned to rates that can best benefit from their intelligence? (71.8% of those assigned to A school are Alphas, see Table 6.) Apparently no one presently knows why the Alpha A school participation

rate is not 80 percent or even 90 percent. Some of the possible explanations include [Sutton, Note 12]:

(1) Lack of specific A school seats at the time the applicant applies for enlistment.

(2) A school assignment is based not on the AFQT but on a specific set of scores from the ASVAB battery. For example, an applicant may have a high AFQT, but might score low in one area, such as Arithmetic Reasoning (AR) which might be required for a rate.

(3) Timing is very important in assignment and an applicant may not be willing to select the delayed entry program in order to receive an A school seat.

(4) The intelligent candidate may be tired of school and decide that he doesn't want to train for a more demanding rate. A GENDET assignment may be desired so the recruit can "sort things out."

Allocation of A school seats has continued to be a complex task for the Navy recruiter. The recruiter is faced with filling quotas, and on slow days he may be willing to entice a lower quality candidate to enlist by offering him an A school seat and an education waiver; while another time he may turn down a highly qualified candidate because he simply does not have seats for the rate(s) the candidate is interested in. A possible solution to this problem is the proposed CLASP system (Classification and Assignment within

Pride).[13] The CLASP system is a real-time conversational computer system designed to provide information to classifiers so that recruit applicants may be assigned to Navy ratings in a near optimal way [Note 13]. Data describing an individual are entered, and a number reflecting the "goodness of fit" between person and job (rating) is produced for each Navy rating. This number or optimality index is based on:

(1) ASVAB test scores

(2) Complexity of tasks within Navy ratings

(3) Occupational preferences

(4) Navy priority attached to the ratings

(5) Level loading of A schools

The CLASP system will not alleviate all of the allocation problems, but it is likely that it will improve on the recruiting process by making better use of scarce resources.

The timing problem, having a seat available for a desirable candidate, has been addressed by the Navy with the PSI (Programmed School Input) program. Some high quality candidates are unwilling to wait for a school seat through the delayed entry program, and the PSI program provides for the enlistment of USN male recruits during the months of June,

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[13] PRIDE (Personalized Recruiting for Immediate and Delayed Enlistment) is a system designed, operated and managed as a means of accounting and controlling Navy school program accessions in various enlisted categories and programs.

July, August and September (heavy recruiting months) of the current year with a specific guarantee of Class "A" school training commencing not later than the following year. The purpose of this option is to allow the enlistment of school program individuals during the period of time when the number of school seats available is considerably less than recruiting quota. It is recommended that the PSI program be directed (if it isn't already) at the high quality candidate who has had a favorable interview with the Classification Interviewer.

It is recognized that there are probably some very intelligent recruits who are "tired" of going to school and do not want an A school assignment, but if this is true they will certainly not be satisfied with their GENDET assignment when their apprentice training is completed. While mental ability (MG) is generally negatively correlated with attrition (AFQT = .001, Table 18), a positive correlation between mental ability and attrition (AFQT B = +.004, Table 24) was found. It should be recognized that those who score high (other things being equal) on the AFQT are generally not as good candidates for GENDET assignment as are those who score lower on the AFQT.

GENDET Survival Prediction

As was shown in Table 22, the Navy's SCREEN table did an excellent job of predicting overall attrition (1 year). However, it was not effective in predicting the survival rates of recruits assigned to apprentice (GENDET) training. The

main reason is that the SCREEN considered all 1973 NPS male accessions, and since GENDETS were a minority, and the table fits "the average," the average is quite different from the GENDET average. Also, AFQT is positively correlated with attrition among the GENDET group (B = .004, Table 24), but AFQT is negatively correlated with attrition in the SCREEN table [Lockman, 1976]. So, while the SCREEN table predicts a higher survival rate for a "smarter" (higher AFQT score) GENDET applicant, the reverse is the case. All other things being equal, the "smarter" a GENDET person is, the more likely he is to leave the Navy. As in the SCREEN table, among GENDETs, years of education is still negatively correlated with attrition. Recruiting MGI candidates with less than 12 years of education (such as Bravos) would almost certainly lead to a low GENDET survival rate. Therefore, it is recommended that the Navy adopt two SCREEN tables, with one for A school candidates and one for GENDETs.

GENDET Attrition Rates

Table 19 has shown that GENDET assignment is significantly related to attrition even when statistically controlling for the fact that GENDET personnel are, on average, less educated than their A school counterparts. Further research is needed to determine specific causes for this difference. The most obvious possibility for higher GENDET attrition rates is the lack of intrinsic rewards from the menial jobs normally assigned to GENDET personnel. Job enrichment may not be a practical possibility, but Guthrie et al., [1978] has recommended

that GENDET personnel be provided with shorter enlistment tours. Additionally, every attempt should be made to provide promising GENDET personnel an opportunity to attend A school. Coupled with a short-term enlistment could be the guarantee of A school assignment if the person reenlists. Also, expansion of the PSI program could give more assurances to recruits that if they "stick it out" for awhile they will be guaranteed an A school seat. Another problem with GENDET personnel is that many of them cannot qualify for an A school seat because of their low ASVAB scores. Currently, a new remedial program for recruits not qualifying for A school takes recruits at the Naval Training Center in San Diego and provides them with special training in reading, writing, listening, computation, study habits, and other skills required in A schools. Additionally, these six week courses provide basic technical training in ship propulsion, electronics, aviation mechanics, and administrative or clerical work. People who complete the JOBS (Job Oriented Basic Skills) program will be assigned to a Class A school. If the JOBS program were expanded to include GENDET personnel already in the Navy, the "carrot" of JOBS and A school might decrease attrition and increase reenlistments at the same time. First, the JOBS expansion could increase reenlistments by making reenlistment a requirement to be eligible for the JOBS program. Secondly, it could reduce attrition because it would offer an incentive for staying until attendance at JOBS, and

because it appears from this research that A school attendees are less likely to attrite from the Navy.

Situational Variables

Multiple regression analyses reported in this thesis strongly suggest that assignment is associated with the probability of attrition. Comparisons among the R^2s in Tables 18 and 19, and among those in Tables 26 and 27, reveal that the assignment variables add substantially to the accuracy of the multiple regression equations developed to predict attrition or months of service completed successfully. These results suggest that the burden of countering high enlisted attrition rates lies not only in recruiting high quality personnel, but in assigning them to meaningful jobs as well.

Summary of Recommendations

Unless Congress approves drastic pay increases for military personnel in the future, or there is a reinstitution of the Draft, it seems likely that in the 1980's the Navy will have to deal with first term attrition via internal solutions. Though VOLOUT II was a failure in terms of attrition reduction, it is hoped that some of the conclusions and recommendations derived from that study will be useful to Navy planners. The following is a summary of the recommendations based on the conclusions of the VOLOUT II program:

1. A VOLOUT program is not a feasible solution to the attrition problem.

2. A separate category for GED holders should be developed for the Navy's SCREEN Table.

3. The PSI program should be directed at insuring Alpha candidates are given an A school assignment.

4. The Navy should institute a study to investigate why over 33% of Alpha personnel are sent to GENDET duty.

5. The institution of the CLASP system will improve efficiency of allocation of finite manpower resources.

6. The Navy Recruiting Command should adopt a two tiered SCREEN Table that generates separate predictions for A school and GENDET assignments.

7. The Recruiting Command should expand the JOBS and PSI program to include GENDET personnel already actively serving in the Navy.

Areas for Further Research

As a program the VOLOUT concept was a failure, but it did demonstrate that attrition rates do not totally reveal the magnitude of dissatisfaction with the service. When given the opportunity to "vote with their feet," large numbers left the Navy. Two groups, experimental and control, even when controlling for demographical differences, demonstrated that an organizational variable (VOLOUT) could dramatically effect attrition rates. An organizational variable such as the four year enlistment contract could also dramatically effect attrition rates. In essence the control group personnel can "VOLOUT" after four years, and it is theorized that after the 48th month,

the "attrition rates" of the two study groups will be much closer than they were at 34 months. Therefore, it is recommended that the VOLOUT analysis be extended from the 34 month period to 48 months when the needed data become available (late 1980).

Further research could be conducted in the development of situational variables which would further explain the variance in attrition rates. In concert with this, further investigation of the nontraditional predictive model of attrition would be useful in proving whether or not factors such as shore duty assignment and general detail duty are causing attrition. Sinaiko [1977] recommended that case studies be conducted in various units or components (such as shore duty) with special attention to mismatches in attitudes, values, and expectations; and the degree of organizational commitment. The primary goal would be to determine the factors that affect differences in attrition between one "unit" and another. Strategies could then be developed to decrease this variance. A prime candidate, based on the initial assignment results, would be the study of the factors that make sea duty a lower attrition risk than shore duty. Further research might explain this phenomenon.

This thesis has repeatedly shown that GENDET personnel have higher attrition rates than NONGENDETS. The Navy has recognized this fact. For instance, in all three Recruit Training Commands the Navy's Fireman Apprentice Training Program has been expanded from 12 days to a four week

curriculum [New Fireman, 1979]. The new curriculum includes courses in propulsion plant configurations, piping systems and components, PMS documentation procedures and engineering study. It is hoped that the program will provide the fleet with well prepared, well-disciplined and well-motivated people. Further research could determine if firemen who underwent this expanded training have statistically significant lower attrition rates than firemen who received the 12 day course. This thesis could provide a data base for the control group. If there is a statistically significant difference in the desired direction, an expanded apprentice training program for airmen and seamen might, *ceteris paribus*, bring the GENDET attrition rate closer to acceptable levels.

APPENDIX A

NAVY A SCHOOL PAYBACK SCHEDULE

PAY BACK PERIODS

INSTRUCTION (WEEKS)	PAY BACK (MONTHS)
1	1
2	1
3	2
4	3
5	3
6	4
7	5
8	6
9	6
10	7
11	8
12	8
13	9
14	10
15	10
16	11
17	12
18	12
19	13
20	14
21	15
22	15
23	16
24	17
25	17
26	18
27	19
28	19
29	20
30	21
31	21
32	22
33	23
34	24
35	24
36	25
37	26
38	26
39	27
40	28
41	28
42	29

PAY BACK PERIODS (CONT'D)

INSTRUCTIONS (WEEKS)	PAY BACK (MONTHS)
43	30
44	30
45	31
46	32
47	33
48	33
49	34
50	35
51	35
52	36
53	37
54	37
55	38
56	39
57	39
58	40
59	41
60	42
61	42
62	43
63	44
64	44
65	45
66	46
67	46
68	47
69	48

APPENDIX B

PROCEDURES FOR DEVELOPING THE TEST STATISTIC FOR TWO POPULATION PROPORTIONS π_1 AND π_2

The central limit theorem can be used to construct a confidence interval estimator of $\pi_1 - \pi_2$. If $\hat{\theta}$ is an unbiased estimator of θ and is approximately normally distributed, this method can be used because both samples (experimental and control) are greater than 100 [see Pfaffenberger and Patterson, 1977].

The appropriate Z statistic used:

$$Z = \frac{(p_1 - p_2)}{\sqrt{\hat{\pi}_p (1 - \hat{\pi}_p) [\frac{1}{n_1} + \frac{1}{n_2}]}}$$

where:

$$\hat{\pi}_p = \frac{n_1 p_1 + n_2 p_2}{n_1 + n_2}$$

```
REM   THIS PROGRAM COMPUTES Z VALUES FOR
REM   TESTING STATISTICAL SIGNIFICANCE BETWEEN
REM   DIFFERENT PROPORTIONS.
REM
REM        BEST = P LT .01
REM        GOOD = P LT .05
REM        NS   = P GT .05
REM
REM   ***************************************
REM
010          READ P1,P2,N1,N2
REM
015           IF N1 LE 0 THEN 190
REM
020          LET P=ABS(P1-P2)
030          LET R1=(N1*P1) + (N2*P2)
040          LET R2=(N1+ N2)
050          LET R=(R1/R2)
060          LET D1=(R)*(1-R)
070          LET D2=(1/N1)+(1/N2)
080          LET D=SQR(D1*D2)
090          LET Z=P/D
REM
100         PRINT
101         PRINT
102         PRINT Z
REM
110           IF Z LT 1.96 THEN 140
120           IF Z LT 2.58 THEN 170
REM
130         PRINT 'BEST'
135          GO TO 010
140         PRINT 'NS'
160          GO TO 010
170         PRINT 'GOOD'
180          GO TO 010
REM
DATA  .561,.364,61,533
DATA   0,0,0,0
REM
190           END
```

APPENDIX C

ATTRITION BY DEMOGRAPHIC AND SITUATIONAL VARIABLES

Table C-1

Attrition at 34 Months by Age for Experimental and Control Groups

	Age at Enlistment									
	17 years		18 years		19-20 years		≥21 years		Total	
	N	percent	N	percent	N	percent	N	percent	N	percent
	Total Losses									
Experimental Group - χ^2(3df) = 30.57; p < .001*										
Active	30	14.9	154	25.2	294	30.6	164	33.9	622	28.4
Attrited	171	85.1	458	74.8	666	69.4	320	66.1	1615	71.6
Total	201	100.0	612	100.0	960	100.0	484	100.0	2257	100.0
Control Group - χ^2(3df) = 50.07; p < .001*										
Active	65	43.9	355	66.2	731	72.1	314	71.0	1465	68.5
Attrited	83	56.1	181	33.8	283	27.9	128	29.0	675	31.5
Total	148	100.0	536	100.0	1014	100.0	442	100.0	2140	100.0
Total Group - χ^2(3df) = 83.59; p < .001*										
Active	95	27.2	509	44.3	1025	51.9	478	51.6	2107	47.9
Attrited	254	72.8	639	55.7	949	48.1	448	48.4	2290	52.1
Total	349	100.0	1148	100.0	1974	100.0	926	100.0	4397	100.0

*χ^2 test of independence is statistically significant at $\leq .05$, i.e., the groups differ significantly in this variable.

Table C-2

Attrition at 34 Months by Race for Experimental and Control Groups

	Racial Composition					
	White		Nonwhite		Total	
	N	percent	N	percent	N	percent
	Total Losses					
Experimental Group - χ^2(1df) = 15.18; $p < .001$*						
Active	513	26.8	129	37.3	642	28.4
Attrited	1398	73.2	217	62.7	1615	71.6
Total	1911	100.0	346	100.0	2257	100.0
Control Group - χ^2(1df) = .368; $p > .5$						
Active	1247	68.2	218	70.1	1465	68.5
Attrited	582	31.8	93	29.9	675	31.5
Total	1829	100.0	311	100.0	2140	100.0
Total Group - χ^2(1df) = 7.19; $p < .01$*						
Active	1760	47.1	347	52.8	2107	47.9
Attrited	1980	52.9	310	47.2	2290	52.1
Total	3740	100.0	657	100.0	4397	100.0

*χ^2 test of independence is statistically significant at $\leq .05$, i.e., the groups differ significantly in this variable.

Table C-3

Attrition at 34 Months by Number of Dependents for Experimental and Control Groups

	Number of Dependents					
	None		One or More		Total	
	N	percent	N	percent	N	percent
	Total Losses					
Experimental Group - χ^2(1df) = .928; p > .3						
Active	613	28.7	29	24.2	642	29.4
Attrited	1524	71.3	91	75.8	1615	71.6
Total	2137	100.0	120	100.0	2257	100.0
Control Group - χ^2(1df) = 2.46; p > .1						
Active	1378	68.9	87	62.1	1465	68.5
Attrited	622	31.1	53	37.9	675	31.5
Total	2000	100.0	140	100.0	2140	100.0
Total Group - χ^2(1df) = 1.07; p > .3						
Active	1991	48.1	116	44.6	2107	47.9
Attrited	2146	51.9	144	55.4	2290	52.1
Total	4137	100.0	260	100.0	4397	100.0

Table C-4

Attrition at 34 Months by Years of Formal Education Completed for Experimental and Control Groups

	Years of Formal Education									
	≤10 years		11 years		12 years		>12 years		Total	
	N	percent	N	percent	N	percent	N	percent	N	percent
	Total Losses									
Experimental Group - χ^2(3df) = 51.04; $p < .001$*										
Active	53	16.5	82	20.6	442	32.7	65	34.9	642	28.4
Attrited	269	83.5	317	79.4	908	67.3	121	65.1	1615	71.6
Total	322	100.0	399	100.0	1350	100.0	186	100.0	2257	100.0
Control Group - χ^2(3df) = 166.30; $p < .001$*										
Active	103	38.7	181	57.3	1056	76.0	125	74.4	1465	68.5
Attrited	163	61.3	135	42.7	334	24.0	43	25.6	675	31.5
Total	266	100.0	316	100.0	1390	100.0	168	100.0	2140	100.0
Total Group - χ^2(3df) = 198.07; $p < .001$*										
Active	156	26.5	263	36.8	1498	54.7	190	53.7	2107	47.9
Attrited	432	73.5	452	63.2	1242	45.3	164	46.3	2290	52.1
Total	588	100.0	715	100.0	2740	100.0	354	100.0	4357	100.0

*χ^2 test of independence is statistically significant at $\leq .05$, i.e., the groups differ significantly in this variable.

Table C-5

Attrition at 34 Months by Educational Certificate Attained for Experimental and Control Groups

	Education Certificate Attained									
	NHS GRAD		GED CERT		HS GRAD		HS +		Total	
	N	percent	N	percent	N	percent	N	percent	N	percent
	Total Losses									
Experimental Group - χ^2(3df) = 81.86; p < .001*										
Active	78	14.9	40	19.3	506	34.4	18	33.3	642	28.4
Attrited	446	85.1	167	80.7	966	65.6	36	66.7	1615	71.6
Total	524	100.0	207	100.0	1472	100.0	54	100.0	2257	100.0
Control Group - χ^2(3df) = 171.42; p < .001*										
Active	171	44.5	87	50.6	1183	76.3	24	72.7	1465	68.5
Attrited	213	55.5	85	49.4	368	23.7	9	27.3	675	31.5
Total	384	100.0	172	100.0	1551	100.0	33	100.0	2140	100.0
Total Group - χ^2(3df) = 260.99; p < .001*										
Active	249	27.4	127	33.5	1689	55.9	42	48.3	2107	47.9
Attrited	659	72.6	252	66.5	1334	44.1	45	51.7	2290	52.1
Total	908	100.0	379	100.0	3023	100.0	87	100.0	4397	100.0

*χ^2 test of independence is statistically significant at $\leq .05$, i.e., the groups differ significantly in this variable.

Table C-6

Attrition at 34 Months by Mental Group Category for Experimental and Control Groups

	Mental Group Category											
	I		II		III U		III L		IV U		Total	
	N	percent	N	percent	N	percent	N	percent	N	percent	N	percent
	Total Losses											
Experimental Group - $\chi^2(4df) = 1.84; p > .7$												
Active	33	30.8	223	29.2	215	29.1	157	26.5	13	26.5	641	26.5
Attrited	74	69.2	542	70.8	525	70.9	436	73.5	36	73.5	1613	73.5
Total	107	100.0	765	100.0	740	100.0	593	100.0	49	100.0	2254	100.0
Control Group - $\chi^2(4df) = 14.68; p < .01$*												
Active	95	79.8	514	69.3	492	69.5	335	63.2	28	71.8	1464	68.5
Attrited	24	20.2	228	30.7	216	30.5	195	36.8	11	28.2	674	31.5
Total	119	100.0	742	100.0	708	100.0	530	100.0	39	100.0	2138	100.0
Total Group - $\chi^2(4df) = 15.60; p < .01$*												
Active	128	56.6	737	48.9	707	48.8	492	43.8	41	46.6	2105	46.6
Attrited	98	43.4	770	51.1	741	51.2	631	56.2	47	53.4	2287	53.4
Total	226	100.0	1507	100.0	1448	100.0	1123	100.0	88	100.0	4392	100.0

*χ^2 test of independence is statistically significant at $\leq .05$, i.e., the groups differ significantly in this variable.

Table C-7

Attrition at 34 Months by Recruit Quality Index for Experimental and Control Groups

	Recruit Quality Index									
	Alpha		Bravo		Charlie		Delta		Total	
	N	percent	N	percent	N	percent	N	percent	N	percent
	Total Losses									
Experimental Group - χ^2(3df) = 62.25; $p < .001$*										
Active	424	33.0	47	14.4	140	31.3	31	15.7	642	28.4
Attrited	861	67.0	280	85.6	308	68.8	166	84.3	1615	71.6
Total	1285	100.0	327	100.0	448	100.1	197	100.0	2257	100.0
Control Group - χ^2(3df) = 132.92; $p < .001$*										
Active	971	74.6	130	48.7	323	71.1	41	35.0	1465	68.5
Attrited	331	25.4	137	51.3	131	28.9	76	65.0	675	31.5
Total	1302	100.0	267	100.0	454	100.0	117	100.0	2140	100.0
Total Group - χ^2(3df) = 198.30; $p < .001$*										
Active	1395	53.9	177	29.8	463	51.3	72	22.9	2107	47.9
Attrited	1192	46.1	417	70.2	439	48.7	242	77.1	2290	52.1
Total	2587	100.0	594	100.0	902	100.0	314	100.0	4397	100.0

*χ^2 test of independence is statistically significant at $\leq .05$, i.e., the groups differ significantly in this variable.

Table C-8

Attrition at 34 Months by Recruit Training Center Attended for Experimental and Control Groups

	Recruit Training Center Attended							
	San Diego		Great Lakes		Orlando		Total	
	N	percent	N	percent	N	percent	N	percent
	Total Losses							
Experimental Group - χ^2(2df) = 11.98; p < .005*								
Active	168	28.0	238	27.0	234	34.7	640	29.7
Attrited	433	72.0	642	73.0	440	65.3	1515	70.3
Total	601	100.0	880	100.0	674	100.0	2155	100.0
Control Group - χ^2(2df) = .826; p > .6								
Active	384	67.0	577	68.6	489	69.4	1450	69.4
Attrited	189	33.0	264	31.4	216	30.6	669	30.6
Total	573	100.0	841	100.0	705	100.0	2119	100.0
Total Group - χ^2(2df) = 10.18; p < .01*								
Active	552	47.0	815	47.4	723	52.4	2090	48.9
Attrited	622	53.0	906	52.6	656	47.6	2184	51.1
Total	1174	100.0	1721	100.0	1379	100.0	4274	100.0

*χ^2 test of independence is statistically significant at $\leq .05$, i.e., the groups differ significantly in this variable.

Table C-9

Attrition at 34 Months by Initial Fleet Duty Assignment for Experimental and Control Groups

Initial Duty Station	Initial Assignments N	Initial Assignments % of Total Assigned	Active After 34 Months N	Active After 34 Months % of Total Assigned	Attrited After 34 Months N	Attrited After 34 Months % of Total Assigned
Experimental Group - χ^2(5df) = 91.86; $p < .001$*						
Air Squadron	106	6.0	64	60.5	42	39.6
Ship	568	32.4	191	33.6	377	66.4
Submarine	101	5.8	50	49.5	51	50.5
Aircraft Carr.	180	10.3	54	30.0	126	70.0
Shore Duty	643	36.7	165	25.7	478	74.3
Sea Duty	155	8.8	84	54.2	71	45.8
Total	1753	100.0	608	34.7	1145	65.3
Control Group - χ^2(5df) = 93.11; $p < .001$*						
Air Squadron	137	7.2	124	90.5	13	9.5
Ship	656	34.5	518	79.0	138	21.0
Submarine	146	7.7	119	81.5	27	18.5
Aircraft Carr.	176	9.3	141	80.1	35	19.9
Shore Duty	620	32.6	386	62.3	234	37.7
Sea Duty	167	8.8	143	85.6	24	14.4
Total	1902	100.0	1431	75.2	471	24.8
Total Group - χ^2(5df) = 168.25; $p < .001$*						
Air Squadron	243	6.6	188	77.4	55	22.6
Ship	1224	33.5	709	57.9	515	42.1
Submarine	247	6.8	169	68.4	78	31.6
Aircraft Carr.	356	9.7	195	54.8	161	45.2
Shore Duty	1263	34.6	551	43.6	712	56.4
Sea Duty	322	8.8	227	70.5	95	29.5
Total	3655	100.0	2039	55.8	1616	44.2

NOTE: Data presented above were based on initial assignment only. Thus, for these variables, there were 742 missing observations primarily personnel who attrited prior to fleet assignment (503 experimental, 239 control).

*χ^2 test of independence is statistically significant at $\leq .05$, i.e., the groups differ significantly in this variable.

Table C-10

Attrition at 34 Months by Rate Classification for Experimental and Control Groups

	Classification					
	NONGENDET		GENDET		Total	
	N	percent	N	percent	N	percent
			Total Losses			
Experimental Group - χ^2(ldf) = 298.40; $p < .001$*						
Active	477	46.4	165	13.4	642	28.4
Attrited	550	53.6	1065	86.6	1615	71.6
Total	1027	100.0	1230	100.0	2257	100.0
Control Group - χ^2(ldf) = 486.93; $p < .001$*						
Active	1179	84.8	286	38.2	1465	68.5
Attrited	212	15.2	463	61.8	675	31.5
Total	1391	100.0	749	100.0	2140	100.0
Total Group - χ^2(ldf) = 908.78; $p < .001$*						
Active	1656	68.5	451	22.8	2107	47.9
Attrited	762	31.5	1528	77.2	2290	52.1
Total	2418	100.0	1979	100.0	4397	100.0

*χ^2 test of independence is statistically significant at $\leq .05$, i.e. the groups differ significantly in this variable.

Table C-11

Attrition at 34 Months by GENDET Rates for Experimental and Control Groups

	GENDET Rate							
	Seaman		Firemen		Airmen		Total	
	N	percent	N	percent	N	percent	N	percent
	Total Losses							
Experimental Group - $\chi^2(2df) = 9.65;\ p < .01$*								
Active	96	11.7	34	14.1	35	20.6	165	13.4
Attrited	723	88.3	207	85.9	135	79.4	1025	86.6
Total	819	100.0	241	100.0	170	100.0	1230	100.0
Control Group - $\chi^2(2df) = 34.20;\ p < .001$*								
Active	141	30.2	85	53.5	60	48.8	286	38.2
Attrited	326	69.8	74	46.5	63	51.2	463	61.8
Total	467	100.0	159	100.0	123	100.0	749	100.0
Total Group - $\chi^2(2df) = 40.36;\ p < .001$*								
Active	237	18.4	119	29.8	95	32.4	451	18.4
Attrited	1049	81.6	281	70.3	198	67.6	1528	81.6
Total	1286	100.0	400	100.1	293	100.0	1979	100.0

*χ^2 test of independence is statistically significant at $\leq .05$, i.e. the groups differ significantly in this variable.

Table C-12

Attrition at 34 Months by NONGENDET Categories for Experimental and Control Groups

	NONGENDET Rate Category									
	OPS WEAPS		SUPPORT		ENG		AIR		Total	
	N	percent	N	percent	N	percent	N	percent	N	percent
	Total Losses									
Experimental Group - χ^2(3df) = 39.92; p < .001*										
Active	122	48.6	41	33.1	106	39.0	158	59.6	427	46.8
Attrited	129	51.4	83	66.9	166	61.0	107	40.4	485	53.2
Total	251	100.0	124	100.0	272	100.0	265	100.0	912	100.0
Control Group - χ^2(3df) = 7.18; p < .10										
Active	352	85.4	118	79.2	299	83.1	293	88.0	1062	84.7
Attrited	60	14.6	31	20.8	61	16.9	40	12.0	192	15.3
Total	412	100.0	149	100.0	360	100.0	333	100.0	1254	100.0
Total Group - χ^2(3df) = 35.14; p < .001*										
Active	474	71.5	159	58.2	405	64.1	451	75.4	1489	68.7
Attrited	189	28.5	114	41.8	227	35.9	147	24.6	677	31.3
Total	663	100.0	273	100.0	632	100.0	598	100.0	2166	100.0

*χ^2 test of independence is statistically significant at $\leq .05$, i.e. the groups differ significantly in this variable.

Table C-13

Attrition at 34 Months by Recruit Quality Index for GENDET and NONGENDET Control Group Personnel

	RECRUIT QUALITY INDEX									
	Alpha		Bravo		Charlie		Delta		Total	
	N	percent	N	percent	N	percent	N	percent	N	percent
	Total Losses									
GENDET Group - χ^2(3df) = 25.32; p < .001*										
Active	124	38.8	40	29.2	100	50.3	22	23.7	286	38.2
Attrited	196	61.3	97	70.8	99	49.7	71	76.3	463	61.8
Total	320	100.1	137	100.0	199	100.0	93	100.0	749	100.0
NONGENDET Group - χ^2(3df) = 27.97; p < .001*										
Active	847	86.3	90	69.2	223	87.5	19	79.2	1179	84.8
Attrited	135	13.7	40	30.8	32	12.5	5	20.8	212	15.2
Total	982	100.0	130	100.0	255	100.0	24	100.0	1391	100.0
Total Group - χ^2(3df) = 132.92; p < .001*										
Active	971	74.6	130	48.7	323	71.1	41	35.0	1465	68.5
Attrited	331	25.4	137	51.3	131	28.9	76	65.0	675	31.5
Total	1302	100.0	267	100.0	454	100.0	117	100.0	2140	100.0

*χ^2 test of independence is statistically significant at $\leq .05$, i.e. the groups differ significantly in this variable.

Table C-14

Attrition at 34 Months by Race for GENDET and NONGENDET Control Group Personnel

	Racial Composition					
	White		Nonwhite		Total	
	N	percent	N	percent	N	percent
			Total Losses			
NONGENDET - χ^2(ldf) = .018; p > .5						
Active	1016	84.7	163	85.3	1179	84.8
Attrited	184	15.3	28	14.7	212	15.2
Total	1200	100.0	191	100.0	1391	100.0
GENDET - χ^2(ldf) = 3.17; p < .10						
Active	231	36.7	55	45.8	286	38.2
Attrited	398	63.3	65	54.2	463	61.8
Total	629	100.0	120	100.0	749	100.0
All - χ^2(ldf) = .368; p > .5						
Active	1247	68.2	218	70.1	1465	68.5
Attrited	582	31.8	93	29.9	675	31.5
Total	1829	100.0	311	100.0	2140	100.0

APPENDIX D

ASSUMPTIONS USED IN DEVELOPING A SCREEN TABLE COMPARISON

Mental Group

In completing the SCREEN score comparisons the midpoints for MG were used. Due to renorming and new versions of the ASVAB the MG divisions have sometimes changed. The SCREEN scores used in this study were based on the following divisions [Lockman, Note 14]:

MG	RANGE (AFQT)	MIDPOINT[15]
I	93-100	96.5
II	65-92	78.5
III U	49-64	56.5
III L	31-48	39.5
IV	21-30	25.5

Years of Education

The following assumptions were used to select coefficients for completing years of education in the regression equation:

SCREEN Category	SCREEN Comparison Assumption
< 12	11
12	12
> 12	13

---

[15] Used to compute SCREEN score comparisons based on Equation 1, Table 18.

For example, a white 18 year old high school graduate, mental group one, with no dependents would have a SCREEN score comparison score based on the following computation (Table 18, Equation 1):

$$1 - [(96.5)(-.001) + (12)(-.058) - (.128) + (.057) + .986)]$$

$$= 88$$

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